73® Amateur Radio Today

JULY 1999
ISSUE #465
USA $3.95
CANADA $4.95

Y2K Special!

- Emergency Power (Gas • Wind • Solar)
- Emergency Rig
- Emergency Longwire Antenna

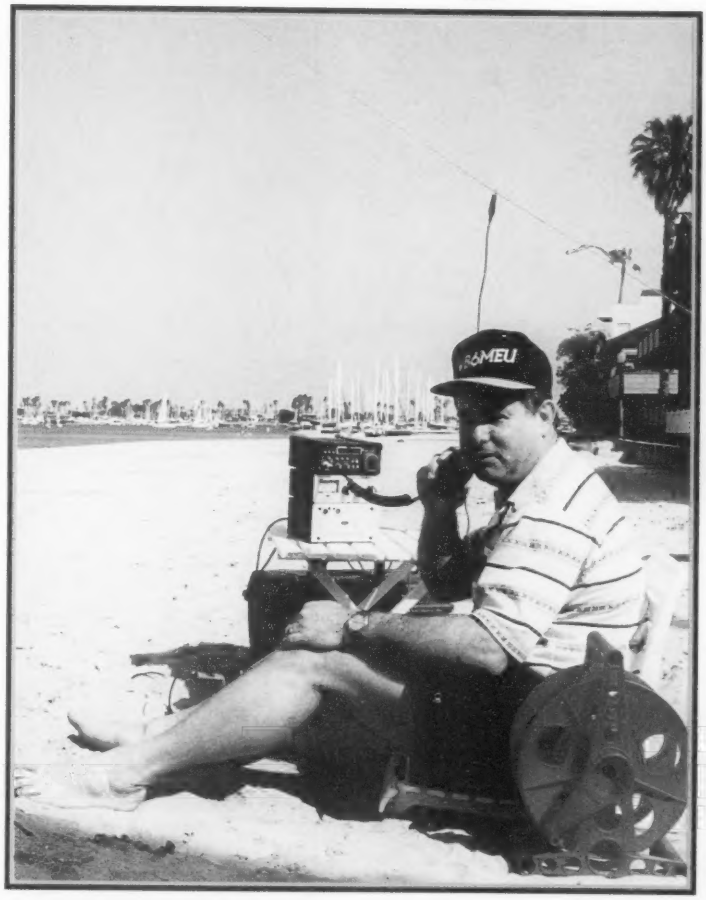
Hole-free Mobile Mount

Moron-Friendly Regen Rx

Ham SOBs

Build a Wiebelfeltzer

Review: Ten-Tec 1254 Rx



Tough life — page 39

**********5-DIGIT 48103
#00000191940MR5# JUN76 210
SERIALS PROCESSING DEPT 45
UNIV MICROFILMS IT P 1
300 N ZEEB RD
ANN ARBOR MI 48103-1553

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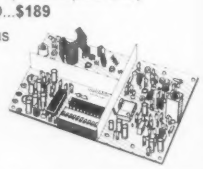
SYNTHESIZED VHF & UHF EXCITER & RECEIVER MODULES

- ***Dip switch frequency selection.***
- ***Exceptional modulation for voice and ctcss.***
- ***Very low noise synthesizer for repeater service.***
- ***Direct fm for data up to 9600 baud.***
- ***TCXO for tight frequency accuracy in wide range of environmental conditions.***
- ***Next day shipping. No wait for crystals.***

EXCITERS:

Rated for continuous duty, 2-3W output.

T301 VHF Exciter: for various bands 139-174MHz, 216-226 MHz.
- Kit (ham bands only) ...**$109** (TCXO option $40)
- Wired/tested, incl TCXO...**$189**

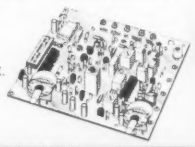


T304 UHF Exciter: various bands 400-470 MHz.
- Kit (440-450 ham band only) incl TCXO ...**$149**
- Wired/tested...**$189**

RECEIVERS:

***Very sensitive** – 0.2µV.*
***Superb selectivity,** >100 dB down at ±12 kHz, best available anywhere, flutter-proof squelch.*

R301 VHF Receiver: various bands 139-174MHz, 216-226 MHz.
- **Kit** (ham bands only) ...**only $139** (TCXO option $40)
- **Wired/tested** ...**$209** (includes TCXO)



R304 UHF Receiver: various bands 400-470MHz.
- Kit (440-450 ham band only) incl TCXO ...**$179**
- Wired/tested...**$209**

TRADITIONAL CRYSTAL-CONTROLLED VHF & UHF FM EXCITERS & RECEIVERS

FM EXCITERS:

2W output, continuous duty.
- **TA51:** for 6M, 2M, 220 MHz ..... **kit $99, w/t $169**
- **TA451:** for 420-475 MHz. ..... **kit $99, w/t $169**
- **TA901:** for 902-928 MHz, (0.5W out) ..... **w/t $169**

VHF & UHF POWER AMPLIFIERS:

Output levels from 10W to 100W.....**Starting at $99**

FM RECEIVERS:

- **R100 VHF FM RCVR.** For 46-54, 72-76, 140-175, or 216-225 MHz. ..... **kit $129, w/t $189**
- **R144 RCVR.** Like R100, for 2M, with helical resonator in front end..... **kit $159, w/t $219**
- **R451 FM RCVR,** for 420-475 MHz. Similar to R100 above. kit $129, w/t $189.
- **R901 FM RCVR,** 902-928MHz ..... **$159, w/t $219**

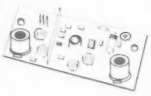
TRANSMITTING & RECEIVING CONVERTERS

- **Convert vhf and uhf signals to & from 10M.**
- Even if you don't have a 10M rig, you can pick up very good used xmtrs & rcvrs for next to nothing.
- Receiving converters (shown above) available for various segments of 6M, 2M, 220, and 432 MHz.
- Rcvg Conv Kits from $49, wired/tested units only $99.

- **Transmitting converters for 2M, 432 MHz.**
- Kits only $89 vhf or $99 uhf.
- Power amplifiers up to 50W.

LOW NOISE RECEIVER PREAMPS

NEW



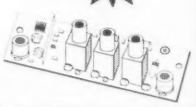
LNY-( ) ECONOMY PREAMP

ONLY $29/w&t
- Miniature MOSFET Preamp.
- Low noise figure.
- RCA jacks allow easy connection inside radios.
- *Available* for various bands from 28 to 450 MHz.

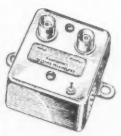
LNP-( ) PRESELECTOR

NEW

ONLY $39/w&t
- Eliminate intermod!
- Low noise preamp
- Sharp 3-section filter
- Available for bands from 137 to 170 MHz.

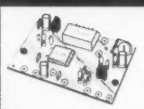


LNG-( ) GaAs FET PREAMP



STILL ONLY $59, wired/tested
- Make your friends sick with envy! Work stations they don't even know are there.
- Install one at the antenna and overcome coax losses.
- *Available for 28-30, 46-56, 137-152, 152-172, 210-230, 400-470, and 800-960 MHz bands.*

SUBAUDIBLE TONE ENCODER/DECODER



- **Encodes** all standard CTCSS tones with crystal accuracy and convenient DIP switch selection.
- **Decoder** can be used to mute receive audio and is optimized for installation in repeaters to provide closed access. High pass filter gets rid of annoying rcvr buzz.
- **TD-5** CTCSS Encoder/Decoder Kit ..... now only **$29**
- **TD-5** CTCSS Encoder/Decoder Wired/tested..... **$49**

WEATHER FAX RECEIVER

A very sensitive wideband fm receiver **optimized for NOAA** APT & Russian Meteor **weather fax** on the 137MHz band.

Covers all 5 satellite channels. Scanner circuit & recorder control allow you to automatically capture signals as satellites pass overhead, even while away from home.

See product review with actual satellite pictures in June 1999 QST, along with info on software and antennas.
- **R139 Receiver Kit** less case **$159**
- **R139 Receiver Kit** with case and AC power adapter **$189**
- **R139 Receiver w/t** in case with AC power adapter ...**$239**
- Internal PC Demodulator Board & Imaging Software **$289**
- Turnstile Antenna **$119**
- Weather Satellite Handbook **$20**

WWV RECEIVER

Hear solar activity reports affecting radio propagation.

Very sensitive and selective crystal controlled superhet, dedicated to listening to WWV on 10 MHz. Performance rivals the most expensive rcvrs.
- **RWWV Rcvr** kit, PCB only **$59**
- **RWWV Rcvr** kit with cabt, spkr, & 12Vdc adapter **$89**
- **RWWV Rcvr** w/t in cabt with spkr & adapter **$129**

Get more features for your dollar with our

REP-200 REPEATER

- ***kit still only $1095***
- ***factory assembled still only $1295***

50-54, 143-174, 213-233, 420-475 MHz. (902-928 MHz slightly higher.)

☞ **FCC type accepted** for commercial service in 150 & 450 MHz bands.

Digital Voice Recorder Option. Allows message up to 20 sec. to be remotely recorded off the air. Play back at user request by DTMF command, or as a periodical voice id, or both. **Great for making club announcements!** ..... **only $100.**

REP-200C Economy Repeater. Real-voice ID, no dtmf or autopatch. .....Kit only $795, w&t $1195.

REP-200N Repeater. Without controller so you can use your own. ..... **Kit only $695, w&t $995.**

You'll KICK Yourself If You Build a Repeater Without Checking Out Our Catalog First!

COR-3. Inexpensive, flexible COR module with timers, courtesy beep, audio mixer. ..... **only $49/kit, $79 w/t.**

CWID. Traditional diode matrix ID'er. ..... **kit only $59.**

CWID-2. Eprom-controlled ID'er..... **only $54/kit, $79 w/t.**

DVR-1. Record your own voice up to 20 sec. For voice id or playing club announcements. ..... **$59/kit, $99 w/t.**

COR-4. Complete COR and CWID all on one board. ID in eprom. Low power CMOS. ..... **only $99/kit, $149 w/t.**

COR-6. COR with real-voice id. Low power CMOS, non-volatile memory. ..... **kit only $99, w/t only $149.**

COR-5. µP controller with autopatch, reverse ap, phone remote control, lots of DTMF control functions, all on one board, as used in REP-200 Repeater. ..... **$379 w/t.**

AP-3. Repeater autopatch, reverse autopatch, phone line remote control. Use with TD-2. ..... **kit $89.**

TD-2. Four-digit DTMF decoder/controller. Five latching on-off functions, toll call restrictor. ..... **kit $79.**

TD-4. DTMF controller as above except one on-off function and no toll call restrictor. Can also use for selective calling; mute speaker until someone pages you..... **kit $49.**

WEATHER ALERT RECEIVER

Good reception even at distances of 70 miles or more with suitable antenna. No comparison with ordinary consumer radios!

Automatic mode provides storm watch, alerting you by unmuting receiver and providing an output to trip remote equipment when an alert tone is broadcast. Crystal controlled for accuracy; **all 7 channels** (162.40 to 162.55).

Buy just the receiver pcb module in kit form or buy the kit with an attractive metal cabinet, AC power adapter, and built-in speaker. Also available factory wired and tested.

RWX Rcvr kit, PCB only **$79**
RWX Rcvr kit with cabinet, speaker, & AC adapter **$99**
RWX Rcvr wired/tested in cabinet with speaker & adapter **$139**

Buy at low, factory-direct net prices and save!
For complete info, call or write for complete catalog.
Order by mail, fax, email, or phone (9-12, 1-5 eastern time).
Min. $6 S&H charge for 1st lb. plus add'l weight & insurance.
Use Visa, MC, Discover, check, or UPS C.O.D.

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Our 38th Year

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(949) 458-7277 • (949) 458-0826

E151765 c E151765 LISTED 2F29

...POWER ON WITH ASTRON

SWITCHING POWER SUPPLIES...

MODEL SS-10TK

MODEL SS-12IF

SPECIAL FEATURES:

- HIGH EFFICIENCY SWITCHING TECHNOLOGY SPECIFICALLY FILTERED FOR USE WITH COMMUNICATIONS EQUIPMENT. FOR ALL FREQUENCIES INCLUDING HF
- HEAVY DUTY DESIGN
- LOW PROFILE, LIGHT WEIGHT PACKAGE
- EMI FILTER
- MEETS FCC CLASS B

PROTECTION FEATURES:

- CURRENT LIMITING
- OVERVOLTAGE PROTECTION
- FUSE PROTECTION.
- OVER TEMPERATURE SHUTDOWN

SPECIFICATIONS:

INPUT VOLTAGE: 115 VAC 50/60HZ OR 220 VAC 50/60HZ SWITCH SELECTABLE

OUTPUT VOLTAGE: 13.8VDC

AVAILABLE WIH THE FOLLOWING APPROVALS: UL, CUL, CE, TUV.

MODEL SS-18

DESKTOP SWITCHING POWER SUPPLIES

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SS-10	7	10	1⅛ x 6 x 9	3.2
SS-12	10	12	1⅛ x 6 x 9	3.4
SS-18	15	18	1⅛ x 6 x 9	3.6
SS-25	20	25	2¼ x 7 x 9⅛	4.2
SS-30	25	30	3¼ x 7 x 9⅛	5.0

MODEL SS-25M

DESKTOP SWITCHING POWER SUPPLIES WITH VOLT AND AMP METERS

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SS-25M*	20	25	2⅛ x 7 x 9⅛	4.2
SS-30M*	25	30	3⅛ x 7 x 9⅛	5.0

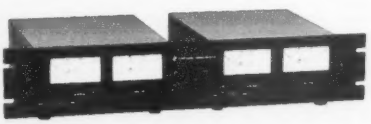
MODEL SRM-30

RACKMOUNT SWITCHING POWER SUPPLIES

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25	20	25	3½ x 19 x 9⅛	6.5
SRM-30	25	30	3½ x 19 x 9⅛	7.0

WITH SEPARATE VOLT & AMP METERS

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25	20	25	3½ x 19 x 9⅛	6.5
SRM-30	25	30	3½ x 19 x 9⅛	7.0



MODEL SRM-30M-2

2 ea SWITCHING POWER SUPPLIES ON ONE RACK PANEL

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25A-2	20	25	3½ x 19 x 9⅛	10.5
SRM-30A-2	25	30	3½ x 19 x 9⅛	11.0

WITH SEPARATE VOLT & AMP METERS

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25M-2	20	25	3½ x 19 x 9⅛	10.5
SRM-30M-2	25	30	3½ x 19 x 9⅛	11.0

MODEL SS-12SM/GTX

CUSTOM POWER SUPPLIES FOR RADIOS BELOW

EF JOHNSON AVENGER GX-MC41
EF JOHNSON AVENGER GX-MC42
EF JOHNSON GT-ML81
EF JOHNSON GT-ML83
EF JOHNSON 9800 SERIES
GE MARC SERIES
GE MONOGRAM SERIES & MAXON SM-4000 SERIES
ICOM IC-F11020 & IC-F2020
KENWOOD TK760, 762, 840, 860, 940, 941
KENWOOD TK760H, 762H
MOTOROLA LOW POWER SM50, SM120, & GTX
MOTOROLA HIGH POWER SM50, SM120, & GTX
MOTOROLA RADIUS & GM 300
MOTOROLA RADIUS & GM 300
MOTOROLA RADIUS & GM 300
UNIDEN SMH1525, SMU4525
VERTEX — FTL-1011, FT-1011, FT-2011, FT-7011

NEW SWITCHING MODELS

SS-10GX, SS-12GX
SS-18GX
SS-12EFJ
SS-18EFJ
SS-10-EFJ-98, SS-12-EFJ-98, SS-18-EFJ-98
SS-12MC
SS-10MG, SS-12MG
SS-101F, SS-121F
SS-10TK
SS-12TK OR SS-18TK
SS-10SM/GTX
SS-10SM/GTX, SS-12SM/GTX, SS-18SM/GTX
SS-10RA
SS-12RA
SS-18RA
SS-10SMU, SS-12SMU, SS-18SMU
SS-10V, SS-12V, SS-18V

MODEL SS-IDEFJ-98

*ICS – Intermittent Communication Service

MFJ *Switching* Power Supplies

Power your HF transceiver, 2 Meter/440 MHz mobile/base and accessories with these new 25 or 45 Amp MFJ MightyLite™ Switching Power Supplies!
No RF hash . . . Super lightweight . . . Super small . . . Volt/Amp Meters . . .

NEW!

MFJ-4225MV 25 Amp **$149.95** Add s/h

MFJ-4245MV 45 Amp **$199.95** Add s/h

MFJ's new adjustable voltage switching power supplies do it all! You can power your HF transceiver or 2-Meter/440 MHz mobile or base and accessories.

MFJ's *MightyLites*™ are so lightweight and small you can carry them in the palm of your hand! Take them with you anywhere.

No more picking up and hauling around heavy, bulky power supplies that can give you a painful backache, pulled muscle or hernia.

MFJ's 25 Amp *MightyLite*™ weighs just 3.7 lbs. -- that's *5 times lighter* than an equivalent conventional power supply. MFJ's 45 Amp version is even more dramatic -- *8 times lighter* and weighs just 5.5 pounds!

No RF hash!

These babies are clean . . .

Your buddies won't hear *any* RF hash on your signal! *You* won't hear any in your receiver either!

Some competing switching power supplies generate objectionable RF hash in your transmitted and received signal.

These super clean MFJ *MightyLites*™ meet all FCC Class B regulations.

Low ripple . . . Highly Regulated

Less than 35 mV peak-to-peak ripple under 25 or 45 amp full load. Load regulation is better than 1.5% under full load.

Fully Protected

You won't burn up these power supplies! They are fully protected with Over Voltage and Over Current protection circuits.

Worldwide Versatility

MFJ *MightyLites*™ can be used anywhere in the world! They have switchable AC input voltage and work from 85 to 135 VAC or 170 to 260 VAC. Easily replaceable fuse.

MightyLites™ . . . Mighty Features

MFJ *MightyLites*™ feature a front-panel voltage control. It lets you vary the output voltage from 9 to 15 Volts DC and gives you a highly regulated voltage output.

You get an easy access front-panel with five-way binding posts for heavy duty use and a cigarette lighter socket for mobile accessories. The MFJ-4245MV has two sets of quick-connects on the rear for accessories.

Large 3 inch dual meters are brightly illuminated to make it easy to monitor load voltage and current.

A *whisper quiet* internal fan efficiently cools your power supply for long life.

Two models to choose from . . .

MFJ-4225MV, $149.95. 25 Amps maximum or 22 Amps continuous. Weighs 3.7 pounds. Measures 5¾Wx4½Hx6D inches.

MFJ-4245MV, $199.95. 45 Amps maximum or 40 Amps continuous. Weighs 5.5 pounds. Measures 7½Wx4¾Hx9D inches.

MFJ No Matter What™ Warranty

MightyLites™ are covered by MFJ's famous *No Matter What*™ one year limited warranty. MFJ will repair or replace (at our option) your power supply for one full year.

MFJ 35/30 Amp *Adjustable* Regulated DC Power Supply

Massive 19.2 pound transformer . . . No RF hash . . . Adjustable 1 to 14 VDC . . .

NEW!
MFJ-4035MV
$149.95
Add s/h

MFJ's heavy duty conventional power supply is excellent for powering your HF or 2 Meter/440 MHz transceiver and accessories.

A massive 19.2 pound transformer makes this power supply super heavy duty! It delivers 35 amps maximum and 30 amps continuous without even flexing its muscles. Plugs into any 110 VAC wall outlet.

It's highly regulated with load regulation better than 1%. Ripple voltage is less than 30 mV. *No RF hash* -- it's super clean!

Fully protected -- has over voltage protection, fold back short circuit protection and over-temperature protection.

You get front panel adjustable voltage from 1 to 14 VDC with a convenient detent set at 13.8 VDC. A pair of front-panel meters let you monitor voltage and current.

Three sets of output terminals include a pair of heavy duty five-way binding posts for HF/VHF radios, two pairs of quick-connects for shack accessories and a covered cigarette lighter socket for mobile accessories.

A front-panel fuse holder makes fuse replacement easy. Whisper quiet fan speed increases as load current increases -- keeps components cool. 9½Wx6Hx9¾ inches.

Your MFJ-4035MV is protected by MFJ's famous *No Matter What*™ one year limited warranty. MFJ will repair or replace (at our option) your power supply for one full year.

MFJ *High Current* Multiple DC Power Outlets

Power two HF/VHF transceivers and six or more accessories from your 12 VDC power supply

MFJ-1118
$69.95
Add s/h

MFJ-1116
$44.95
Add s/h

MFJ-1112
$29.95
Add s/h

MFJ-1118, $69.95. This is MFJ's most versatile and highest current *Deluxe Multiple DC Power Outlet*. It lets you power two HF and/or VHF transceivers and six or more accessories from your transceiver's main 12 VDC power supply.

Two pairs of *super* heavy duty 30 amp 5-way binding posts connect your transceivers. Each pair is fused and RF bypassed. Handles 35 Amps total. "ON" LED.

Six pairs of heavy duty, RF bypassed 5-way binding posts let you power your accessories. They handle 15 Amps total, are protected by a master fuse and have an ON/OFF switch with an "ON" LED indicator.

Built-in 0-25 VDC voltmeter. You get 6 feet of super heavy duty eight gauge color-coded cable with ring tongue terminals. Binding posts are spaced for standard dual banana plugs.

Heavy duty aluminum construction. 12½x2¾x2½ inches.

MFJ-1116, $44.95. Similar to MFJ-1118. No 30 amp posts. Has "ON" LED and 0-25 VDC voltmeter. 15 amps total.

MFJ-1112, $29.95. Similar to MFJ-1116. No on/off switch, LED, meter, fuse.

Free MFJ Catalog
Nearest dealer/Orders . . . 800-647-1800

http://www.mfjenterprises.com **FAX: (601) 323-6551**
• 1 year *No Matter What*™ warranty • 30 day money back guarantee (less s&h) on orders from MFJ • **Add s/h**

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MFJ . . . the world leader in ham radio accessories

JULY 1999
ISSUE #465

73 Amateur Radio Today

TABLE OF CONTENTS

FEATURES

10 **Emergency Power for Hams — WA8YKN**
... including your own experimental wind generator.

20 **The VK Winged Flapper — VK2AT**
Only an Aussie would come up with this mobile antenna design.

22 **Regens for the Millennium — KA9GDL**
Part 2: Winding coils.

27 **You, Too, Can Be an SOB — K9AZG**
Hams should be heard but not seen — put your left hand on the Callbook *and repeat after me.*

31 **The Amazing Wiebelfeltzer — K8MKB**
This CW filter is semi-analog, quasi-digital, and weirdo-nomic.

34 **It's Senior Spider vs. Y2K! — WA8TXT**
Build this QRP rig now — just in case.

39 **Long Beach Longwire — WB6MEU**
You're really *"on the air" with this beach kite antenna.*

REVIEW

28 **The Ten-Tec 1254 — WB8VGE**
Fifteen programmable memories enhance this microprocessor-controlled receiver.

DEPARTMENTS

WB6IGP 43 Above & Beyond
49 Ad Index
64 Barter 'n' Buy
54 Calendar
KB7NO 52 The Digital Port
W5ACM 45 Hamsats
KØOV 47 Homing In
W2NSD/1 4 Never Say Die
48 New Products
KE8YN/4 51 On the Go
W1XU/7 62 Propagation
6 QRX
63 Radio Bookshop
56 Update

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On the cover: It's a tough station, but somebody has to man it. Article begins on page 39. We are always looking for interesting articles and cover photos — with or without each other. Your name could be in this space *next* month, and our check could be on its way to *you!* You couldn't use a little extra cash?

Feedback: Any circuit works better with feedback, so please take the time to report on how much you like, hate, or don't care one way or the other about the articles and columns in this issue. G = great!, O = okay, and U = ugh. The G's and O's will be continued. Enough U's and it's Silent Keysville. Hey, this is *your* communications medium, so don't just sit there scratching your...er...head. FYI: Feedback "number" is usually the page number on which the article or column starts.

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NEVER SAY DIE

Wayne Green W2NSD/1

Why You Get Sick

The *cause* of *all* sickness is really very simple, as is the *cure* for *all* illness. The $1.5 trillion American medical industry, with its chemo, radiation, bypass operations, and million-dollar machines is mostly nonsense. Let me explain this in simple terms and see if it doesn't make sense to you.

When you drink enough whiskey you get drunk, right? Okay, so what kind of a pill, shot, vitamin, herb concoction, food supplement, or surgery will sober you up as long as you continue to drink?

Think of the billions of dollars that the medical industry is spending on research for a pill they can patent and sell you to cure drunkenness. Or call it cancer, arthritis, heart trouble, stroke, Alzheimer's, Parkinson's, depression, attention deficit disorder, multiple sclerosis, lupus, diabetes, AIDS, and so on.

My *Secret Guide to Health* exposes this dirty secret and explains how you can stop making yourself sick. What kind of a business would the medical industry be if all it had to do was repair the damage done by accidents and muggings? Pffft goes the pharmaceutical industry. No more nursing homes. We'd need 90% fewer hospitals and doctors. And fewer lawyers. And insurance companies. And HMOs.

If I can get you to stop doing the things that are causing you to get sick, you'll get well. Sickness isn't caused by God, Mother Nature, satan, or even bad luck. It's caused 100% by you.

My *Guide*, which would be a huge bargain at $5,000, is just $5 ($3 s/h). I hope you'll read it and then get copies for your family and friends. If we can get the word around, we can virtually destroy the medical industry, as well as the food giants, the milk industry, and so on.

More Mooning

If you think Wayne was like a broken record (for those of you old enough to remember records) about the Moon hoax, you ain't seen nothin' yet. Now I'm arming myself with a whole new bunch of facts, courtesy of *Dark Moon*, a new book from England.

Like the study done by David Groves Ph.D. on the Ektachrome film used by our Moon walkers. He found three major problems. First, the film clouds up and loses contrast rapidly when exposed to x-ray radiation, as we might expect. The amount of this radiation, once one is no longer protected by the Van Allen belt, is not only deadly to living things, but is enough to completely ruin film. Cameras would have to have at least six inches of lead to protect any film. Our astronauts used somewhat modified Hasselblad cameras. No lead.

Then there's the temperatures. It's about 300° in the sun and –200° in the shade. The working range of Ektachrome is far, far short of those extremes. When cold, the film becomes brittle and breaks. When hot, it melts.

I've seen how well composed and exposed the Moon photos were. The surprising thing is that the cameras they used had no viewfinders, nor any way to adjust the exposures for light conditions or focus. Further, the cameras were fastened to the chests of the astronauts, so they had to point them by moving their bodies, yet the resulting photos came out just as if they'd been taken under studio conditions. And some were taken from ten feet above the ground! Hmm, how'd they *do* that?

But that's just one little tidbit I pulled from the inexhaustible supply in this 568-page book. The authors have gone over every shred of evidence and nailed NASA endlessly in lies. NASA has understandably refused to answer any of their many questions.

If you're interested, I've got some copies available for $35 ($3 s/h). It isn't yet available from Amazon or Barnes & Noble, so I had some flown over from London for you. Be the first on your block to get one.

Closed Windows

It must be very frustrating for you for me to keep pushing you to try new things and to make changes in your life. A recent study, published in *The New Yorker*, reported that only young people are amenable to change, or contribute much in the way of creativity to our world. The truly creative work in art, music, and science is being done by young people.

If you haven't been introduced to classical music before you are 30, the odds are 95% that you aren't ever going to go for it. Ditto learning to like (or even try, for that matter) any new foods, wearing different clothes, or accepting new scientific ideas.

In study after study of creativity, age has turned out to be a leading factor in its decline. The profession of mathematics is founded almost entirely on the creative breakthroughs of brilliant youngsters. This holds, too, for composers, poets, and scientific research. Older minds are not only less likely to generate anything new, they're less open to accept new ideas from anyone else.

All of the major amateur radio developments and pioneering were done by youngsters. I was there and knew most of 'em. The League put a stop to that nonsense 35 years ago.

So here I am, doing my best to get you interested in new ideas — and wondering why I'm going over like a lead balloon. If I could get you to change to a raw food diet I could help you get over any illness you have and lose weight until you are back to normal. But hell will have to freeze over first. I should be writing for *Boy's Life* and *Seventeen*, I suppose.

I love new ideas, and I've made major changes in my lifestyle, but then I'm just probably in my second childhood. Can I get you to join in my games? Hmm, I thought not.

Leptons

Bob Shrader W6BNB, who is retired and apparently has far too much time on his hands, decided to try to bring himself up to date on the makeup of the atom. A lot has changed since his (and my) college physics courses. It used to be that the atom was made up of protons, electrons, and neutrons. And that worked just fine.

Bob recently sent me a paper which pretty well sums up what's happened since we went to college, complete with mesons, baryons, six kinds of quarks, hadrons, leptons, muons, photons, phonons, gluon forces, tau particles,

Continued on page 57

World's Smallest TV Transmitters

We call them the 'Cubes'.... Perfect video transmission from a transmitter you can hide under a quarter and only as thick as a stack of four pennies- that's a nickel in the picture! Transmits color or B&W with fantastic quality - almost like a direct wired connection to any TV tuned to cable channel 59. Crystal controlled for no frequency drift with performance that equals law enforcement models that cost hundreds more! Basic 20 mW model transmits up to 300' while the high power 100 mW unit goes up to 1/4 mile. Audio units include sound using a sensitive built-in mike that will hear a whisper 15 feet away! Units run on 9 volts and hook-up to most any CCD camera. Any of our cameras have been tested to mate perfectly with our Cubes and work great. Fully assembled - just hook-up power and you're on the air!

C-2000, Basic Video Transmitter Cube..... $89.95
C-3000, Basic Video & Audio Transmitter Cube..... $149.95
C-2001, High Power Video Transmitter Cube..... $179.95
C-3001, High Power Video & Audio Transmitter Cube... $229.95

CCD Video Cameras

Top quality Japanese Class 'A' CCD array, over 440 line line resolution, not the off-spec arrays that are found on many other cameras. Don't be fooled by the cheap CMOS single chip cameras which have 1/2 the resolution, 1/4 the light sensitivity and draw over twice the current! The black & white models are also super IR (Infra-Red) sensitive. Add our invisible to the eye, IR-1 illuminator kit to see in the dark! Color camera has Auto gain, white balance, Back Light Compensation and DSP! Available with Wide-angle (80°) or super slim Pin-hole style lens. Run on 9 VDC, standard 1 volt p-p video. Use our transmitters for wireless transmission to TV set, or add our IB-1 Interface board kit for audio sound pick-up and super easy direct wire hook-up to any Video monitor, VCR or TV with A/V input. Fully assembled, with pre-wired connector.

CCDWA-2, B&W CCD Camera, wide-angle lens..... $69.95
CCDPH-2, B&W CCD Camera, slim fit pin-hole lens..... $69.95
CCDCC-1, Color CCD Camera, wide-angle lens..... $129.95
IR-1, IR Illuminator Kit for B&W cameras..... $24.95
IB-1, Interface Board Kit..... $14.95

Mini Radio Receivers

Imagine the fun of tuning into aircraft a hundred miles away, the local police/fire department, ham operators, or how about Radio Moscow or the BBC in London? Now imagine doing this on a little radio you built yourself - in just an evening! These popular little receivers are the nuts for catching all the action on the local ham, aircraft, standard FM broadcast radio, shortwave or WWV National Time Standard radio bands. Pick the receiver of your choice, each easy to build, sensitive receiver has plenty of crystal clear audio to drive any speaker or earphone. Easy one evening assembly, run on 9 volt battery, all have squelch except for shortwave and FM broadcast which has handy SCA output. Add our snazzy matching case and knob set for that smart finished look.

AR-1, Airband 108-136 MHz Kit..... $29.95
HFRC-1, WWV 10 MHz (crystal controlled) Kit..... $34.95
FR-1, FM Broadcast Band 88-108 MHz Kit..... $24.95
FR-6, 6 Meter FM Ham Band Kit..... $34.95
FR-10, 10 Meter FM Ham Band Kit..... $34.95
FR-146, 2 Meter FM Ham Band Kit..... $34.95
FR-220, 220 MHz FM Ham Band Kit..... $34.95
SR-1, Shortwave 4-11 MHz Band Kit..... $29.95
Matching Case Set (specify for which kit)..... $14.95

Tiny FM Transmitters

Gosh, these babies are tiny - that's a quarter in the picture! Choose the unit that's best for you. FM-5 is the smallest tunable FM transmitter in the world, picks up a whisper 10' away and transmits up to 300'. Runs on tiny included watch battery, uses SMT parts. FM-4 is larger, more powerful, runs on 5-12 volts, goes up to a mile. FM4,5 operate in standard FM band 88-108 MHz. FM-6 is crystal controlled in 2 meter ham band, 146.535 MHz, easily picked up on scanner or 2 meter rig, runs on 2 included watch batteries. SMT (surface mount) kits include extra parts in case you sneeze & loose a part!

FM-4MC, High Power FM Transmitter Kit..... $17.95
FM-5, World's Smallest FM Transmitter Kit..... $19.95
FM-6, Crystal Controlled 2M FM Transmitter Kit..... $39.95
FM-6, Fully Wired & Tested 2M FM Transmitter..... $69.95

Super Pro FM Stereo Transmitter

Professional synthesized FM Stereo station in easy to use, handsome cabinet. Most radio stations require a whole equipment rack to hold all the features we've packed into the FM-100. Set freq with Up/Down buttons, big LED display. Input low pass filter gives great sound (no more squeals or swishing from cheap CD inputs!) Limiters for max 'punch' in audio - without over mod, LED meters to easily set audio levels, built-in mixer with mike, line level inputs. Churches, drive-ins, schools, colleges find the FM-100 the answer to their transmitting needs, you will too. Great features, great price! Kit includes cabinet, whip antenna, 120 VAC supply. *We also offer a high power export version of the FM-100 that's fully assembled with one watt of RF power, for miles of program coverage. The export version can only be shipped outside the USA, or within the US if accompanied by a signed statement that the unit will be exported.*

FM-100, Pro FM Stereo Transmitter Kit..... $249.95
FM-100WT, Fully Wired High Power FM-100..... $399.95

FM Stereo Radio Transmitters

No drift, microprocessor synthesized! Excellent audio quality, connect to CD player, tape deck or mike mixer and you're on-the-air. Strapable for high or low power! Runs on 12 VDC or 120 VAC. Kit includes case, whip antenna, 120 VAC power adapter - easy one evening assembly.

FM-25, Synthesized FM Stereo Transmitter Kit.... $129.95

Lower cost alternative to our high performance transmitters. Great value, tunable over FM band, plenty of power and manual goes into great detail about antennas, range and FCC rules. Handy kit for sending music thru house and yard, ideal for school projects too - you'll be amazed at the exceptional audio quality! Runs on 9V battery or power from 5 to 15 VDC. Add our matching case and whip antenna set for a nice 'pro' look.

FM-10A, Tunable FM Stereo Transmitter Kit..... $34.95
CFM, Matching Case and Antenna Set..... $14.95
FMAC, 12 Volt DC Wall Plug Adapter..... $9.95

RF Power Booster

Add muscle to your signal, boost power up to 1 watt over a freq range of 100 KHz to over 1000 MHz! Use as a lab amp for signal generators, plus many foreign users employ the LPA-1 to boost the power of their FM transmitters, providing radio service through an entire town. Runs on 12 VDC. For a neat finished look, add the nice matching case set.

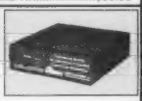
LPA-1, Power Booster Amplifier Kit..... $39.95
CLPA, Matching Case Set for LPA-1 Kit..... $14.95
LPA-1WT, Fully Wired LPA-1 with Case..... $99.95

FM Station Broadcast Antenna

For maximum performance, a good antenna is needed. Properly tuned and matched antenna is fully PVC enclosed for weather protection and rugged use. Vertical or horizontal mounting, 'F' style connector, 5' long.

TM-100, Tru-Match FM Station Antenna Kit..... $39.95

AM Radio Transmitter



Operates in standard AM broadcast band, set to clear channel in your area. AM-25 'pro' version is synthesized for stable, no-drift frequency and is setable for high power output where regulations allow, typical range of 1-2 miles. Entry-level AM-1 has tunable transmit oscillator, runs FCC maximum 100 mw power, expected range 1/4 mile. Both accept line-level inputs from tape decks, CD players or mike mixers, run on 12 volts DC. Pro AM-25 includes AC power adapter, matching case and bottom loaded wire antenna. Entry-level AM-1 has an available matching case and knob set for a finished, professional look. High level modulation for low distortion.

AM-25, Professional AM Transmitter Kit..... $129.95
AM-1, Entry level AM Radio Transmitter Kit..... $29.95
CAM, Matching Case Set for AM-1..... $14.95

RAMSEY

Binocular Special

Wow, did we nab a deal on these first rate binoculars! Absolutely identical to a famous big name brand here in Rochester, NY - but without 'their' name. Well made with fully coated optics, super nice rubber armored housing over hi-alloy aluminum, includes lens cleaner cloth, neck lanyard and carry case. 4 styles: roof prism 10x25 (10 power, 25 mm), 10x25 high performance roof prism ruby coated objective lens model for demanding use in bright sun, 10x25 high-end BAK-4 lens porro prism ruby coat with TacGrip housing, and Ultra-View 10x50 porro prism ruby coats. First quality, yet at a close-out price on the exact same units as the 'Trademarked' units - but at half price!

BNO-M, 8x21 Mini Monocular..... $14.95
BNO-1, 10x25 Roof Prism Binoculars..... $24.95
BNO-1EX, 10x25 Ruby Coated Porro Prism..... $29.95
BNO-2, 10x25 TacGrip Ruby Coat Porro Prism..... $59.95
BNO-6, 10x50 Ultra-View Ruby Coat Porro Prism... $69.95

World's Smallest FM Radios

Everyone who sees one of these babies says they just gotta have one! Super cute tiny FM radios have automatic scan/search tuning, comfortable ear bud earphones and we even include the battery. The pager style unit looks like a shrunken pager and even has an LCD clock built-in. You will be amazed at the crystal clear amazing sound! That's a quarter in the picture for size comparison - pretty tiny, huh?

MFMT-1, World's Smallest FM Radio..... $11.95
PFMR-1, Pager Style LCD Clock & FM Radio..... $12.95

Speech Descrambler

Decode all that gibberish! This is the popular descrambler / scrambler that you've read about in all the Scanner and Electronic magazines. Speech inversion technology is used, which is compatible with most cordless phones and many police department systems, hook it up to your scanner speaker terminals and you're in business. Easily configured for any use: mike, line level and speaker output/inputs are provided. Also communicate in total privacy over telephone or radio, full duplex operation - scramble and unscramble at the same time. Easy to build, all complex circuitry contained in new custom ASIC chip for clear, clean audio. Runs on 9 to 15VDC. Our matching case set adds a professional look to your kit.

SS-70A, Speech Descrambler/Scrambler Kit..... $39.95
CSS, Custom Matching Case and Knob Set..... $14.95
SS-70AWT, Fully Wired SS-70A with Case..... $79.95
AC12-5, 12 Volt DC Wall Plug Adapter..... $9.95

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QRX . . .

FISTS vs. ARRL

While all eyes are now on the FCC regarding the future of ham radio, FISTS—the British Morse code preservation society, with a chapter in the United States—is very critical of the recent ARRL ham radio restructuring proposal. In part two of her interview with *Amateur News Weekly*'s Charlie Cotterman KA8OQF, FISTS' Nancy Kott WZ8C said that the ARRL is not adequately supporting Morse code.

... I think that by telling the FCC that it is OK to lower the requirements 12 WPM and by giving away some of our CW subbands to the sideband portion of the band, I think that they are setting a precedent and [things] can only get worse. ...

What is FISTS' position on the ARRL proposal?

... FISTS is not against restructuring, but as the international Morse preservation society we are against the lowering of standards as they apply to Morse code. Of course, we are against the proposed loss of some of our CW frequencies. ...

Should the Amateur Community make their individual opinions in this situation known? And who should they make them known to?

... We should definitely raise our voices and let our opinions be known about this. I would urge everybody to let their ARRL leadership know how they feel. Write your director and the president and the vice president of the ARRL. Let them know how you feel, because they are supposed to be representing the majority of the hams. ...

The storm that is brewing on the horizon has the distinct flavor of the ones that happened during the changeover to incentive licensing ... and the introduction of the codeless entry license to the ham ranks.

Tnx and a big clenched one to the South Jersey Radio Association's *Harmonics*, September 1998, John Buzby W2BU, editor.

For Sale

Or, how to use the classifieds to dig a hole with an FT-101.

MONDAY. For sale: R.D. Jones has one FT-101 radio for sale. Phone after 7:00 p.m. and ask for Mrs. Kelly, who lives with him. Cheap.

TUESDAY. We regret having erred in R.D. Jones' ad yesterday. It should have read: One FT-101 radio, cheap. Phone and ask for Mrs. Kelly, who lives with him after 7:00 p.m.

WEDNESDAY. R.D. Jones has informed us that he has received several annoying phone calls because of the error we made in yesterday's classified ad. The ad stands correct as follows—For sale: R.D. Jones has one FT-101 radio for sale cheap. Phone after 7:00 p.m. and ask for Mrs. Kelly who loves with him.

THURSDAY. I, R.D. Jones, have no FT-101 radio for sale. I smashed it. Don't call again, as I have had the phone disconnected. I have not been carrying on with Mrs. Kelly. Until yesterday, she was my housekeeper but she quit!

All this goes to prove that a swapmeet might be the safest way to sell your unwanted gear.

Tnx and a one outta two ain't bad, at least he coulda kept the rig to the VK6 Radio Oldtimers Club, via the *marcKey*, newsletter of the Manteca (CA) ARC, Cathy Ledbetter KE6UTO, editor.

Laws for the Common Man

The famous Murphy's Law—If anything can go wrong, it will—is said to have entered history in 1949 at Edwards Air Force Base, when a malfunctioning strap transducer moved one Captain Murphy to his highest eloquence. Other truths attributed to Captain Murphy are: Nothing is ever as simple as it seems. Everything takes longer than you expect. And, left to themselves, things always go from bad to worse.

Since Murphy's extraordinary leap into immortality, many imitators have sought in similar manner to plumb the human condition. Perhaps the most successful was British historian C. Northcote Parkinson, who found that work expands to fill the time allotted to it. Next in notoriety is the (Lawrence) Peter Principle, that in every hierarchy each employee tends to rise to his own level of incompetence.

Lesser known, but just as penetrating, are all of the slippery laws of money. Those and other pearls have been collected by Paul Dickson, whose book, *The Official Rules*, has been published by Delacorte Press.

For example, there's Parkinson's Second Law, which states that expenditures rise to meet income. Further refined by Dunn's Discovery—that the shortest measurable interval of time is the time between the moment you put a little extra aside for a sudden emergency and the arrival of that emergency.

This state of affairs is summed up in Gumperson's Law: After a rise in salary, you will have less money at the end of each month than you had before. With regard to products, Graditor's Laws: (1) If it can break it will, but only after the warranty expires, and (2) A necessary item goes on sale only after you have purchased it at the regular price. To which you may add Dyer's Discovery: It's easy to tell when you've got a bargain—it doesn't fit. And Herblock's Law: If it's good, they'll stop making it.

Car owners are well acquainted with Hartman Automotive Laws: (1) Nothing minor ever happens to a car on the weekend. (2) Nothing minor ever happens to a car on a trip. (3) Nothing minor ever happens to a car.

Which brings me to Samuel Goldwyn's Law of Contracts: A verbal contract isn't worth the paper it's written on. Law-giving actually precedes Murphy by a good many centuries. Samuel Butler knew that all progress is based on the innate desire for every organism to live beyond its income. Josh Billings similarly admonished: Live within your income, even if you have to borrow to do it.

Another great name in the field is Finagle. His unique contributions came in the area of science,

Continued on page 42

Tnx to Jim Kocsis WA9PYH of South Bend IN for sending in this photo of every OM's dream store. Let's see ... down Aisle 2, in between the Spackle and the Sprinklers ... you'll find the Spelling department?

MFJ TUNERS

MFJ-989C *Legal Limit* Antenna Tuner

MFJ uses super heavy duty components to make the world's finest legal limit tuner

MFJ uses super heavy duty components -- roller inductor, variable capacitors, antenna switch and balun -- to build the world's most popular high power antenna tuner.

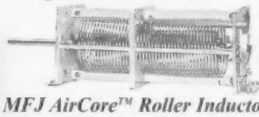
MFJ-989C **$359.95**

The rugged world famous MFJ-989C handles 3 KW PEP SSB amplifier input power (1500 Watts PEP SSB output power). Covers 1.8 to 30 MHz, including MARS and WARC bands.

MFJ's *AirCore*™ roller inductor, new *gear-driven* turns counter and weighted spinner knob gives you exact inductance control for absolute minimum SWR.

You can match dipoles, verticals, inverted vees, random wires, beams, mobile whips, shortwave -- nearly any antenna. Use coax, random wire or balanced lines.

You get everything you've ever wanted in a high power, full featured antenna tuner -- widest matching range, lighted Cross-Needle SWR/Wattmeter, massive transmitting variable capacitors, ceramic antenna switch, built-in dummy load, *TrueCurrent*™ Balun, *scratch-proof* Lexan front panel -- all in a sleek compact cabinet (10¾Wx4½Hx15D in).



MFJ AirCore™ Roller Inductor gives high-Q, low loss, high efficiency and high power handling.

MFJ's exclusive *Self-Resonance Killer*™ keeps damaging self-resonances away from your operating frequency.

Large, self-cleaning wiping contact gives good low-resistance connection. Solid 1/4 inch brass shaft, self-align bearings give smooth non-binding rotation.

MFJ *No Matter What*™ Warranty

MFJ will repair or replace your MFJ-989C (at our option) *no matter what* for one year.

More hams use MFJ tuners than all other tuners in the world!

MFJ-986 Two knob *Differential-T*™

MFJ-986 **$329.95**

Two knob tuning (differential capacitor and *AirCore*™ roller inductor) makes tuning foolproof and easier than ever. Gives minimum SWR at only one setting. Handles 3 KW PEP SSB amplifier input power (1.5 KW output). Gear-driven turns counter, lighted peak/average Cross-Needle SWR/Wattmeter, antenna switch, balun. 1.8 to 30 MHz. 10¾Wx4½Hx15 in.

MFJ-962D *compact* Tuner for Amps

MFJ-962D **$269.95**

A few more dollars steps you up to a KW tuner for an amp later. Handles 1.5 KW PEP SSB amplifier input power (800W output). Ideal for Ameritron's AL-811H! *AirCore*™ roller inductor, gear-driven turns counter, pk/avg lighted Cross-Needle SWR/Wattmeter, antenna switch, balun, Lexan front, 1.8-30MHz. 10¾x4½x10⅞ in.

MFJ-969 300W *Roller Inductor* Tuner

MFJ-969 **$189.95**

Superb *AirCore*™ Roller Inductor tuning. Covers *6 Meters* thru 160 Meters! 300 Watts PEP SSB. *Active* true peak reading lighted Cross-Needle SWR Wattmeter, *QRM-Free PreTune*™, antenna switch, dummy load, 4:1 balun, Lexan front panel. 3½Hx10½Wx9½D inches.

MFJ-949E *deluxe* 300 Watt Tuner

MFJ-949E **$149.95**

More hams use MFJ-949s than any other antenna tuner in the world! Handles 300 Watts. Full 1.8 to 30 MHz coverage, 48 position *Precision48*™ inductor, 1000 Volt tuning capacitors, *full size* peak/average lighted Cross-Needle SWR/Wattmeter, 8 position antenna switch, dummy load, *QRM-Free PreTune*™, scratch proof Lexan front panel. 3½Hx10⅝Wx7D inches. **MFJ-948, $129.95.** Economy version of MFJ-949E, less dummy load, Lexan front panel.

MFJ-941E *super value* Tuner

MFJ-941E **$119.95**

The most for your money! Handles 300 Watts PEP, covers 1.8-30 MHz, *lighted* Cross-Needle SWR/Wattmeter, 8 position antenna switch, 4:1 balun, 1000 volt capacitors, Lexan front panel. Sleek 10½Wx2½Hx7D in.

MFJ-945E HF+6 Meter *mobile* Tuner

MFJ-945E **$109.95**

Extends your mobile antenna bandwidth so you don't have to stop, go outside and adjust your antenna. Tiny 8x2x6 in. *Lighted* Cross-Needle SWR/Wattmeter. Lamp and bypass switches. Covers 1.8-30 MHz *and* 6 Meters. 300 Watts PEP. **MFJ-20, $4.95,** mobile mount.

MFJ-971 *portable/QRP* Tuner

MFJ-971 **$99.95**

Tunes coax, balanced lines, random wire 1.8-30 MHz. Cross-Needle Meter. SWR, 30/300 or 6 Watt QRP ranges. Matches popular MFJ transceivers. Tiny 6x6½x2½ inches.

MFJ-901B *smallest* Versa Tuner

MFJ-901B **$79.95**

MFJ's smallest (5x2x6 in.) and most affordable wide range 200 Watt PEP Versa tuner. Covers 1.8 to 30 MHz. Great for matching solid state rigs to linear amps.

MFJ-16010 *random* wire Tuner

MFJ-16010 **$49.95**

Operate all bands anywhere with MFJ's reversible L-network. Turns random wire into powerful transmitting antenna. 1.8-30 MHz. 200 Watts PEP. Tiny 2x3x4 in.

MFJ-906/903 *6 Meter* Tuners

MFJ-906 **$79.95**

MFJ-906 has lighted Cross-Needle SWR/Wattmeter, bypass switch. Handles 100 W FM, 200W SSB. **MFJ-903, $49.95.** Like MFJ-906, less SWR/Wattmeter, bypass switch.

MFJ-921/924 *VHF/UHF* Tuners

MFJ-921 or MFJ-924 **$69.95**

MFJ-921 covers 2 Meters/220 MHz. **MFJ-924** covers 440 MHz. SWR/Wattmeter. 8x2½x3 inches. Simple 2-knob tuning for mobile or base.

MFJ-922 144/440 MHz Tuner

MFJ-922 **$79.95**

Ultra tiny 4x2½x1¼ inch tuner covers VHF 136-175 MHz and UHF 420-460 MHz. SWR/Wattmeter reads 60/150 Watts.

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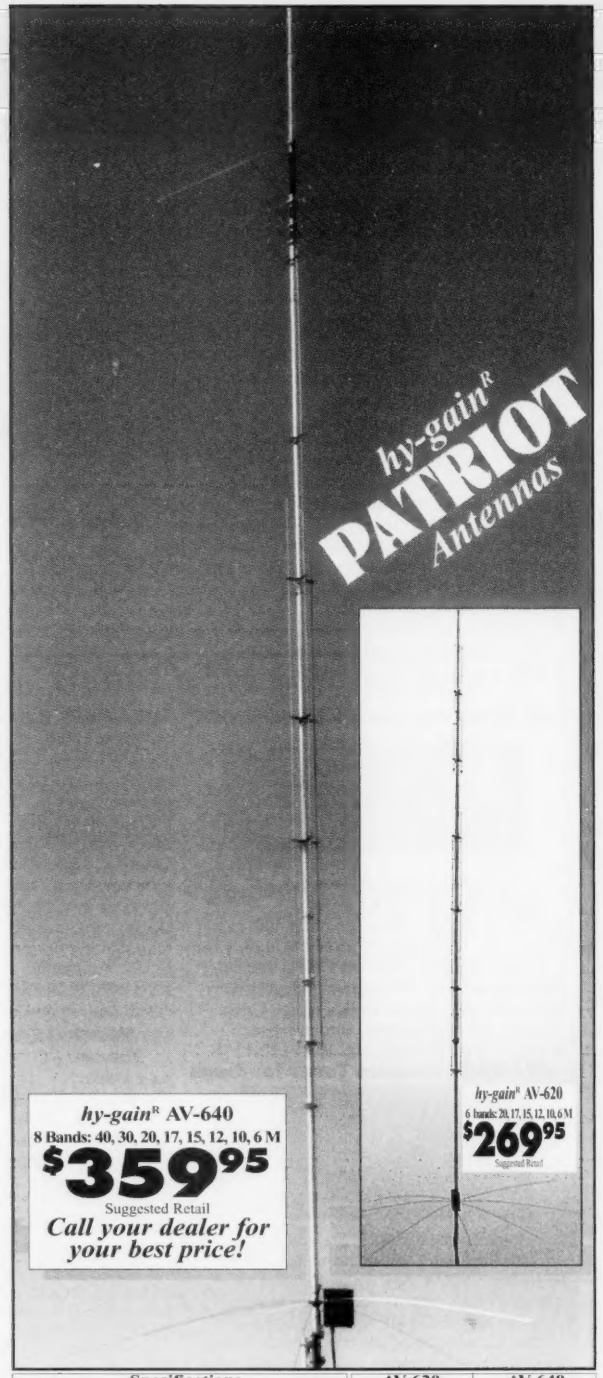
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Specifications	AV-620	AV-640
Bands covered (meters)	6,10,12, 15,17,20	6,10,12,15, 17,20,30,40
2:1 VSWR Bandwidth (KHz)		
40M	N/A	150
30M	N/A	175
20M	500	500
17M	500	500
15M	500	500
12M	500	500
10M	1500	1500
6M	2000	1500
VSWR at resonance (typical)	1.5:1	1.5:1
Power handling (watts output) key down 2 minutes	1500	1500
Vertical radiation angle (degrees)	17	17
Horizontal radiation angle (degrees)	360	360
Height (feet)	22.5	25.5
Weight (pounds)	10.5	17.5
Wind surface area (square feet)	2.4	2.5
Wind survival (mph)	80	80

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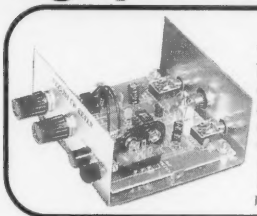

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20/30/40/80 Meter QRP CW transmitter Kits have variable crystal oscillator tuning, front panel switch selects 1 of 2 crystals. 1 crystal included. Transmit and Receive switch. Connect receiver. 1¾x4x3⅛ in. *Intermediate skill level.* Order **VEC-1220K** (20 Meters), **VEC-1230K** (30 Meters), **VEC-1240K** (40 Meters), **VEC-1280K** (80 Meters), **$29.95 ea.**

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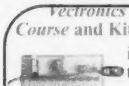

Super CW filter/amplifier Kit has powerful 1 watt audio amplifier to drive speaker. 8 poles active IC filtering uses cascaded low-Q stages. 3 bandwidths: 80,110, 180 Hz. Center frequency: 750 Hz. Up to 15 dB. Use 9-18VDC, 300 mA max. 1⅞x4x3½ in. *Simple skill level.* Order **VEC-821K, $29.95.**

Super SSB Audio Filter Kit improves readability with 8 poles, optimizes audio bandwidth, reduces SSB splatter, low, hi-pitched interference, hiss, static crashes, background noise. Use 9V battery. 1⅞x4x 3½ in. *Simple skill level.* Order **VEC-830K, $19.95.**

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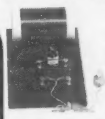

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Super CW Audio Filter Kit gives you three bandwidths: 80, 110, 180 Hz. Eight poles gives super steep skirts with no ringing. Pull CW QSOs out of terrible QRM! Plugs into phone jack to drive phones. QRM down 60 dB one octave from center frequency (750 Hz) for 80 Hz bandwidth. Improves S/N ratio 15 dB. Use 9V battery. 1⅞x4x 3½ in. *Simple skill level.* Order **VEC-820K, $19.95.**

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Last year was a record one for violent weather around the world. Weather-related disasters in 1998 cost a staggering 89 *billion* dollars, more than for the *entire decade* of the '80s. Three hundred million homes were destroyed by violent weather in 1998, and over 32,000 people lost their lives. If the first months of 1999 were any indication, this trend is going to continue. Add to this the increase in earthquake and volcanic activity, satellite-eating solar flares from cycle 23, and the possibility of power and communications disruptions due to the Y2K computer problem, and we may be in for a wild ride into the next millennium.

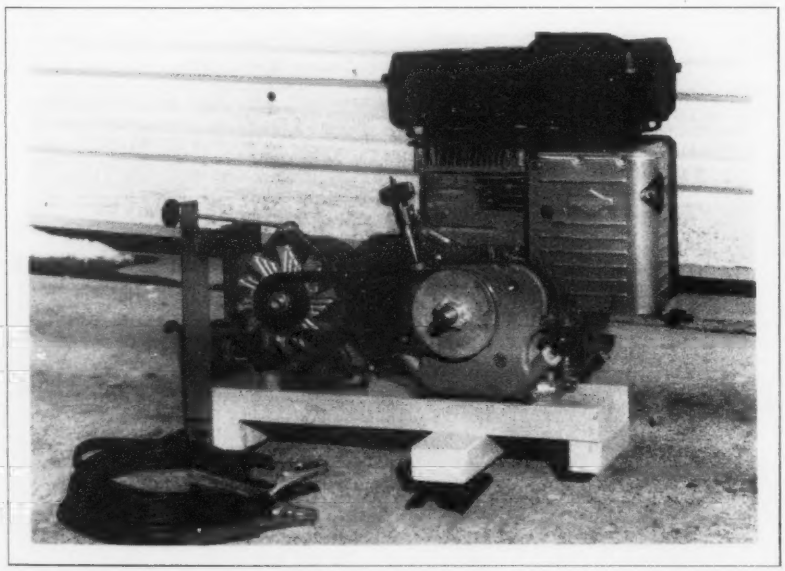

Photo A. *A gas engine, an automobile alternator, and a few scraps of wood and angle iron can be assembled into the ultimate battery charger.*

We may think of amateur radio as an exciting and challenging hobby, but in truth we're an *emergency service*. When a disaster strikes, electrical power and telephone service may be disrupted over a wide area for days or weeks. Amateur radio operators must be ready to step in and provide communications for police, fire, and rescue services. In a time when the government is desperately selling off every available scrap of radio spectrum to commercial interests, amateur radio has survived and prospered simply because of our ability to help the public in times of emergency. It's our job, and nobody does it better.

The missing link: emergency power

The radio equipment we use on a daily basis can easily be pressed into emergency service, and any ham worth his salt can cut a wire to resonance and rig a makeshift antenna. Unfortunately, the electrical grid is usually the first thing to fail in an emergency, and very few amateur stations are equipped to operate without commercial power. If we are to do our part and justify the frequency spectrum we occupy, we should strive to get as many amateur

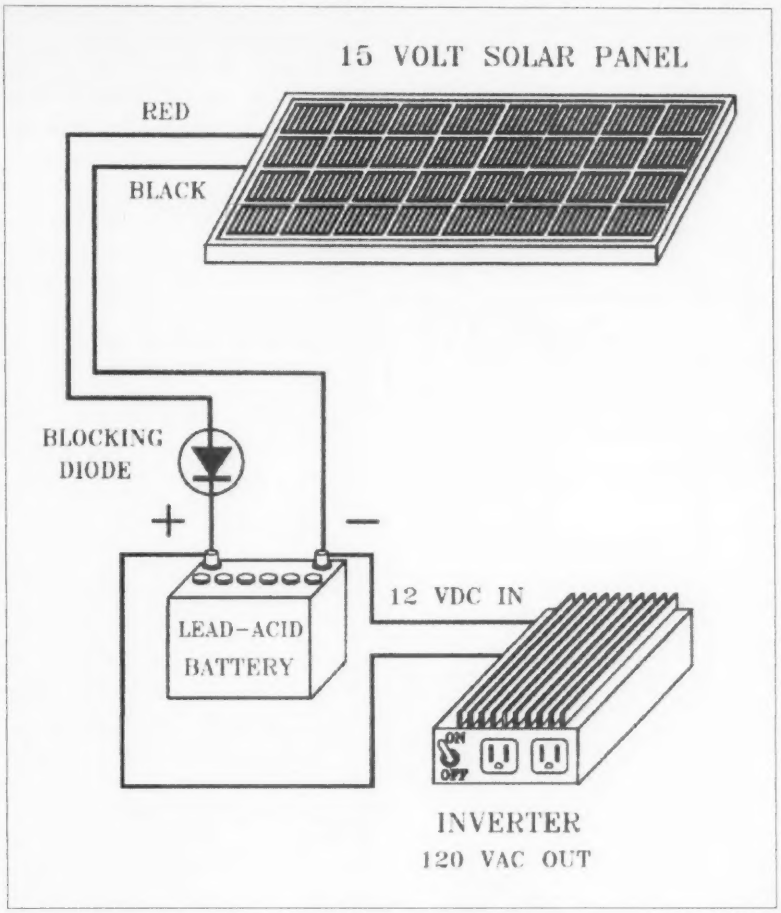

Fig. 1. Photovoltaic panels keep the batteries charged and ready to provide 12 volt DC power for emergency communications. By using an inverter, 120 volt AC power is available as well.

radio stations as possible ready to operate from some form of emergency power. With hams lining up to buy new HF rigs costing several thousand dollars apiece, it shouldn't be too much to spend a fraction of that amount to keep that equipment on the air when it's needed most.

Batteries: the heart of the system

When most people think of emergency power, they think of a gasoline-powered generator to produce 120 volts AC. While this may be the correct approach for powering motors and large appliances, it's not the best choice for powering communications equipment. Consider that a small engine will consume about a gallon of gasoline per hour, so even a full 55-gallon drum of gas will be empty in two days. Unless you plan on a very short disaster, we need a power source better suited to long-term, low current service with occasional high current peaks. You may want a generator for other purposes, but since most amateur radio equipment in use today operates from a 12 volt DC power source, it makes more sense to begin with a good set of batteries.

If your current requirements are very low, a single large automotive battery may be adequate. However, the plates in automotive batteries are made from a sponge-like form of lead to increase the surface area, and will warp and short under long-term high current operation. A much better source is the *deep cycle* battery. These have plates designed for steady discharge followed by rapid recharging, and will last many

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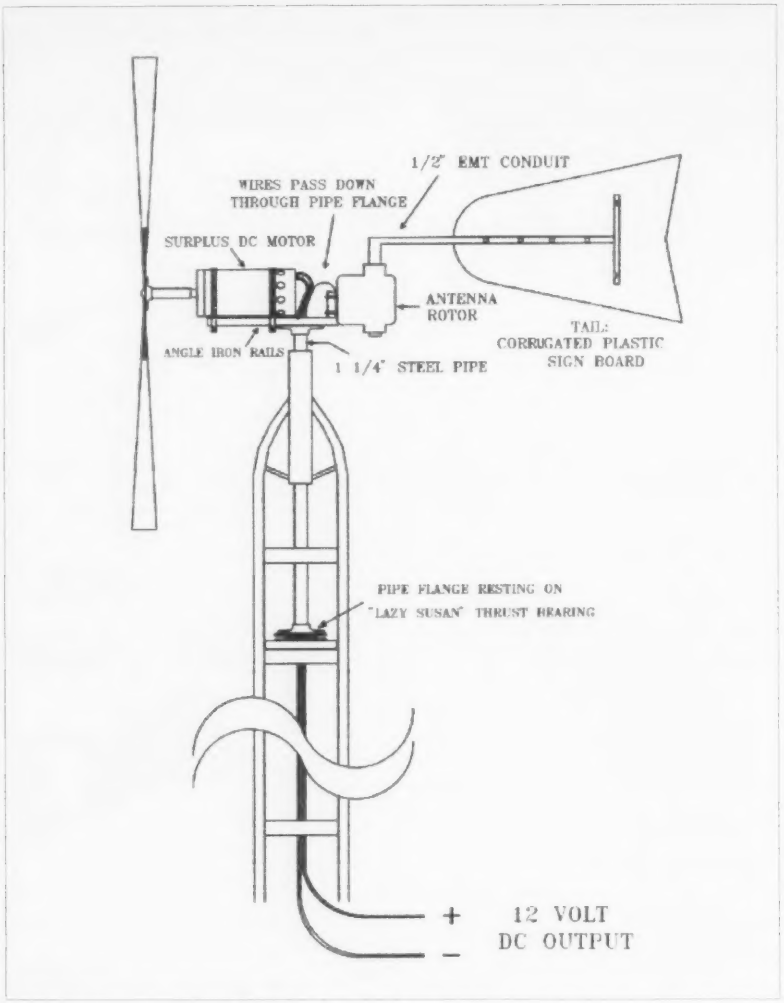

Fig. 2. In some locations, the wind blows more often than the Sun shines. A wind generator can be built from a surplus DC motor to keep the batteries charged and ready for an emergency.

times longer than the automotive battery in this type of service.

A common type of deep cycle battery is the marine battery designed for use with electric trolling motors. Marine batteries are easy to find, and usually cost about a third more than the standard automotive batteries. While not in quite the same class as industrial batteries used in lift trucks and other electric vehicles, they do seem to work well under the type of loads encountered in the Amateur Radio Service.

If possible, try to find a type with removable caps. Many batteries sold today are sealed, and supposedly "maintenance free." What this really means is that there is *no way* to maintain them, so you are expected to throw them away and replace them every now and then. In emergency service, where it will be necessary to keep them at full charge for long periods of time, it's far better to be able to check the electrolyte level and monitor the state of the individual cells with a hydrometer. This means that you have to be able to access the electrolyte.

Another reason to find non-sealed batteries is electrolyte additives. The biggest reason for battery failure is due to the buildup of sulfates on the battery plates. There are additives available that will prevent sulfates from forming. In fact, adding a small amount to each battery cell will actually remove sulfate buildup from an old battery, sometimes restoring it to useful service. Battery additives such as VX-6 or CHARGE-IT can be found in auto parts stores, or obtained by mail from J.C. Whitney.

Installing your battery bank

While a single battery may be enough for your needs, you can increase the available current by connecting two or more in parallel. If you do this, you should find batteries of the same size and type, which of course won't be a problem if you buy them at the same time.

Since lead-acid batteries produce hydrogen gas, it's not a good idea to have a bank of them cooking off in your basement right next to the furnace. A better choice might be the garage, or a small shed located away from the house. Wherever you decide to locate your batteries, plan to include a battery box with a vent to the outside to prevent hydrogen gas from building up to dangerous levels.

When running the power wires from the batteries to your equipment, don't forget to install a fuse! A large bank of batteries can store an incredible amount of energy, and an accidental short could release it all at once ... not unlike a stick of dynamite going off! Fuse your system at a safe level for the size wire used—for example, 30 amps for #10 AWG wire, 40 amps for #8 AWG, etc.

Charging the batteries

Since the purpose of emergency power is to operate when commercial power is unavailable, it's not enough to rely on the AC line to charge the batteries. If you have a gas-powered generator, you can use it to power a standard battery charger as needed. If you don't have a generator, you can easily build a suitable gas-powered battery charger using a small engine and an automobile alternator. A 3-1/2 horsepower lawnmower engine will drive a 60 amp alternator. A 5 horsepower engine will generate 100 amps or more. If you use a modern alternator with a built-in voltage regulator, wiring

is reduced to a connection from the alternator output to the positive battery terminal and a wire from the alternator case to the negative pole of the battery. It's also a good idea to add an ammeter in the positive lead to monitor the output current.

Automobile alternators are voltage-regulated, which is fine for batteries that are maintained at full charge. However, if you completely discharge the battery, a voltage-regulated system will attempt to charge the battery at the full output current of the alternator. Deep cycle batteries should be charged at about ten percent of the amp-hour rating. For example, a 200 amp-hour battery should be charged at 20 amps. The full output of a 100 amp alternator could be enough to damage the battery. If your battery bank is large enough to handle the alternator output, this won't be a problem. If you are using a smaller battery, you can series a few tenths of an ohm using a large ceramic power resistor or even the element from an electric heater to limit the current to a safe level. Add a knife switch or use a jumper cable to short across the resistor as the battery approaches full charge.

Older alternators without the built-in regulators can be controlled simply by inserting a resistor between the positive terminal and the field. By using a large rheostat, you can set the output current to any level you desire up to the full capability of the alternator. A 30 ohm 100 watt rheostat is a good place to start. This type of current-regulated system will not automatically limit the voltage once the batteries reach full charge, so if there are voltage-sensitive loads connected to the batteries, you will have to monitor the voltage and increase the rheostat resistance as needed to keep the voltage at a safe level.

"Free energy" sources

Although a gas-powered charging system is great for a quick, high-current boost, there are several disadvantages. Gasoline is dangerous to store, and doesn't keep well without special stabilizers. The constant sound of a small engine will quickly drive both

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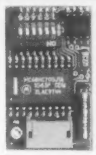

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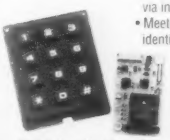

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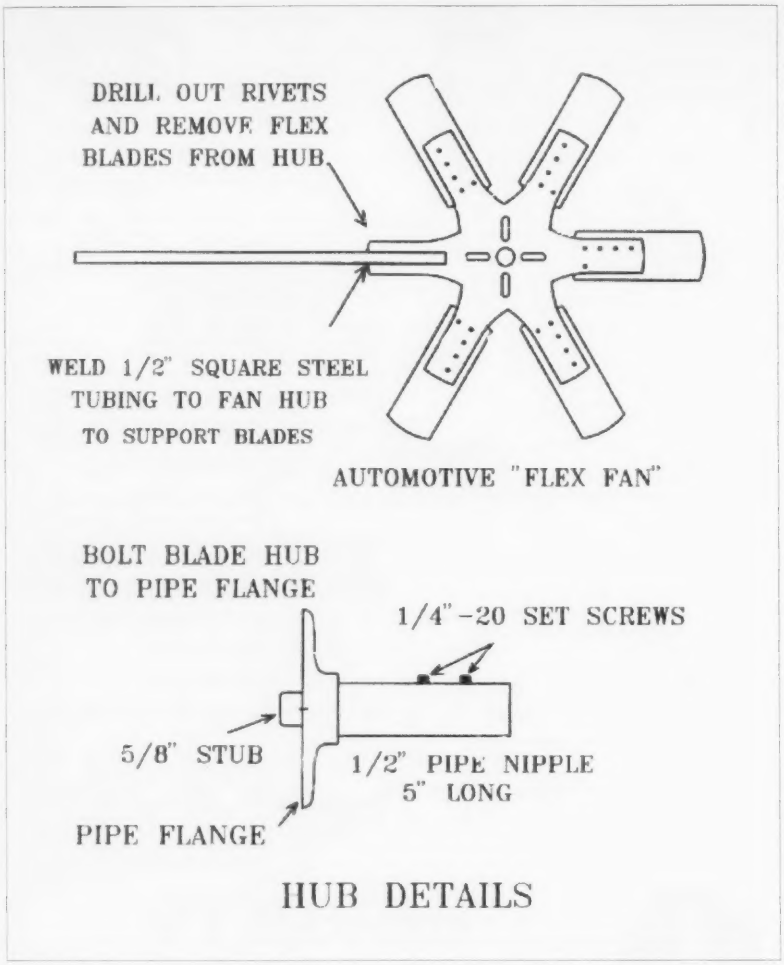

Fig. 3. The wind generator is built around a replacement automobile "Flex-Fan," six pieces of 1/2"-square steel tubing, and an arbor made from pipe fittings.

you and your neighbors crazy, undesirable at a time when stress is already high. Gas engines also produce exhaust, which can create a carbon monoxide hazard. The alternative is to charge your batteries with one or more natural energy sources. The two most common are solar and wind energy.

Fig. 1 shows a simple system consisting of a 15 volt photovoltaic panel connected through a reverse-blocking diode to charge a battery. More panels and batteries can be added in parallel to increase the available current. The diode, required to prevent the battery from discharging through the solar panel at night, must be rated for more current than the panel (or panels) can produce. Power can be taken directly from the battery for 12 volt DC loads, or the battery can drive an inverter to produce 120 volts AC to power lights and household appliances.

Photovoltaic panels have several advantages that make them worth considering. They have no moving parts to wear out, and they're completely silent in operation. It only requires two wires to hook them up, and operation is totally automatic. You can expect to get 20 years or more of useful service from a solar panel with no maintenance other than to keep it clean.

On the other hand, solar electricity is extremely expensive. New panels will cost around $150 per amp of charging current. Any major power requires the equivalent of shingling your house with five dollar bills! Also, this power is only available for a portion of each day, and even that is considerably reduced in bad weather.

Even with these disadvantages, a few solar panels may be worthwhile if only to keep your batteries fully charged. The small array shown in **Photo C** will produce 15 volts at 2 amps in full sunlight, and even on cloudy days will generate an amp or more. They have kept the main batteries fully charged for the past year without any problems. Once discharged, the solar array will bring the batteries up to full charge by themselves in about a week. A low-powered station, such as a Ten-Tec Argonaut and perhaps a two-meter HT, could be powered continuously using no more than a small marine battery and a solar panel or two.

Wind power

Here in Indiana, it seems that the wind blows a lot more often than the Sun shines. It makes sense to utilize some of this energy for our needs, especially if it's to augment the power generated through photovoltaic panels. Unlike solar energy, wind power works both night and day, rain or shine. While much more of a mechanical challenge than solar panels, a modest wind generator in a good location will generate five times the power for the same outlay of cash. Many ready-built wind generators are on the market in every conceivable size, with outputs from a few hundred watts up to many kilowatts. Prices start in the $400 range and go up sharply from there.

If you have a welder and some mechanical ability, a small wind generator is not really very difficult to build. **Fig. 2** shows an experimental generator built from odds and ends that is capable of producing 5 to 10 amps of charging current in a stiff breeze.

The heart of the wind generator is a surplus DC motor from Fair Radio Sales. Rated at 72 volts, the motor will generate 12 volts when spun at around 100 RPM, so direct-drive is feasible. The rotor hub is actually the center from a replacement automobile fan with the flexible blades removed. The remaining blade stubs are already twisted at a 30 degree angle, which is a reasonable pitch for the torque and speed required. A spar made from 1/2"-square steel tubing is welded onto each of the six blade positions. The hub is

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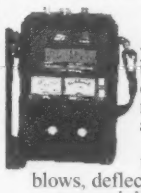

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fastened to the motor shaft with an arbor made from a short piece of 3/4" pipe and a pipe flange.

Blades for the rotor are made from corrugated plastic signboard. Two identical 10" by 30" pieces are cut for each blade and are pop-riveted together, with the 1/2"-square steel spar sandwiched down the middle and anchored with sheet metal screws. Duct tape will seal the edges of the blades.

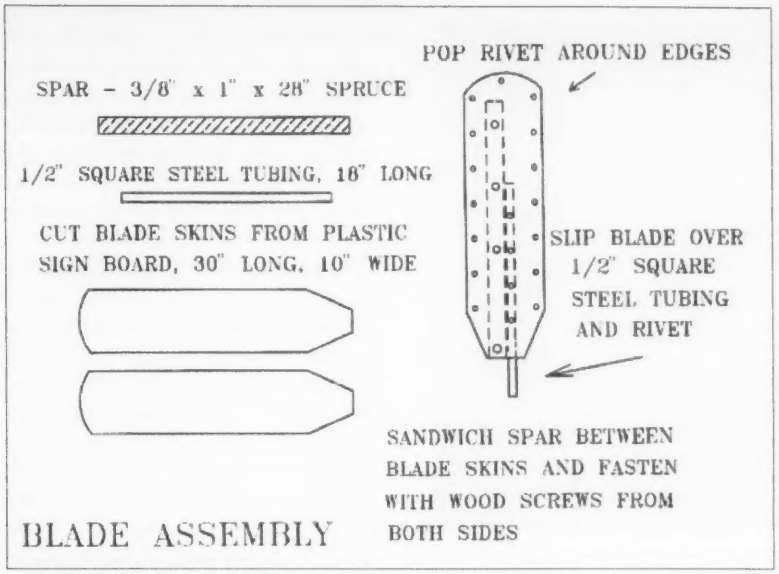
The DC motor is strapped into a cradle made from two pieces of angle iron welded to an upside-down pipe flange. The flange then threads onto a four-foot length of 1-1/4" pipe that serves as a mast. The mast pipe rests on a "lazy Susan" ball bearing inside the tower, allowing it to pivot freely. Rather than build a complex collar and brush mechanism, the wires from the DC motor were simply passed down through the center of the mast pipe. The wind very seldom shifts around a full 360 degrees, and even should this happen it will only cause a single twist in a pair of wires hanging straight down for fifty feet—hardly a cause for concern.

Water-pumping windmills used a folding tail to protect the rotor from excessive wind. A similar method was used here, but instead of pulling on a rope to fold the tail, an old antenna rotor serves the purpose. Mounted on a short section of mast welded to the angle-iron cradle, the rotor controls a tail vane made from the same corrugated plastic signboard as was used for the blades. The plastic is pop-riveted to a boom and crosspiece made from 1/2" electrical conduit. When storms or high winds are expected, the rotor drives the tail vane 90 degrees, moving the blades sideways to the wind and protecting them from damage.

The wind generator must be connected to the batteries through a blocking diode, just like the one used for the solar panels. Without a diode, the motor would simply spin, driving the rotor in reverse until the batteries were drained. If the wind generator produces more than 12 volts, some way to regulate the current is necessary to protect the batteries. This can be as simple as a power resistor (or an automobile headlight) connected in series with the positive lead, or as complex as an electronic voltage and current regulator circuit.

The wind generator is an ongoing experiment, and so far has survived 50 mph winds while facing the wind. It's even withstood gusts over 70 mph with the tail folded. Future experiments will include larger motors geared up to higher speed using chain and sprockets borrowed from a go-cart. For information on the wind generator project, go

***Photo B.** Two or more large batteries can be connected in parallel for increased capacity.*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SANDWICH SPAR BETWEEN BLADE SKINS AND FASTEN WITH WOOD SCREWS FROM BOTH SIDES
BLADE ASSEMBLY

Fig. 4. The wind generator blades are cut from corrugated plastic signboard. Two pieces are pop-riveted together with a spruce spar between them for stiffness.

to my Web site [www.bioelectrifier.com], where I have set up a page for updates as they develop.

120 volt AC power

Okay, you've got a set of batteries, and all your 12 volt DC-powered equipment is functional. What about 120 volt AC power for additional equipment, a few lights, and if it's wintertime, your furnace? It's also nice to be able to power your television in a disaster, since the visual medium can provide maps and other information difficult to obtain elsewhere. Most home appliances operate from 120 volt AC power, so it's a good idea to have some way of providing it when it's needed.

The most common way to generate AC power is to use a gasoline-powered generator. These are available in

***Photo C.** It's important to keep your solar panels clean!*

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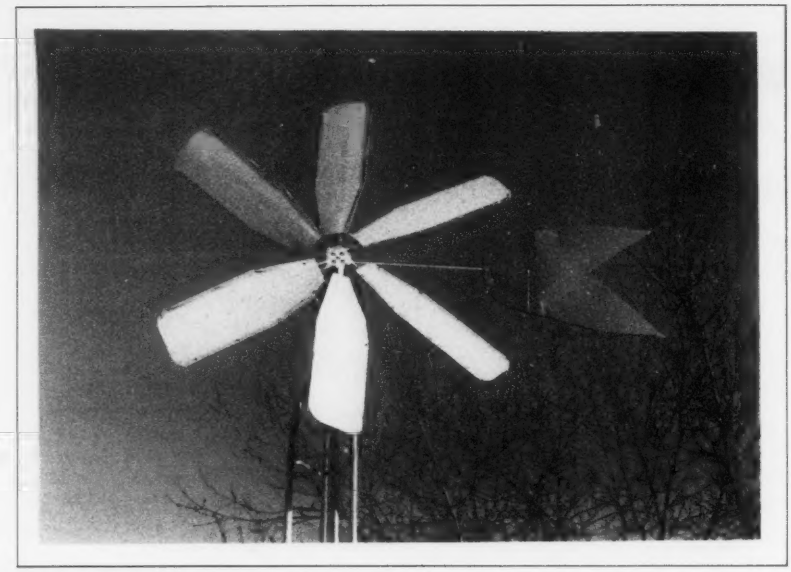

Photo D. *The wind generator helps keep the batteries charged when the Sun is nowhere to be found. The tail is folded to prevent damage to the rotor in high winds.*

sizes to suit your needs, from a few hundred watts to generators capable of running your entire house. They're simple to operate, and provide a fairly good sine wave. A 5 horsepower gas engine will drive a 2,500 to 3,000 watt generator, which is adequate for most backup needs, and will cost around $275 to $400. The biggest disadvantage, as mentioned earlier, is that it's impossible to store enough gasoline to run a generator for any appreciable length of time.

It's also possible to produce 120 volt AC power from your batteries by using a solid-state inverter. These are available in sizes ranging from small 200 watt units up to very large inverters capable of producing 3,000 watts or more. Unlike engine-powered generators, an inverter is silent in operation, which can be a blessing in the wee hours of the morning.

One advantage of using batteries and an inverter to produce AC power is that they can be set up to come on automatically when the commercial power fails. Many inverters come equipped with a connection for a remote-start contact. This connection can be easily added to others by simply soldering a pair of wires across the power switch. These wires are then connected to a set of normally closed contacts on a small relay with a 120 volt AC coil. The coil is energized from the commercial AC line. When the power fails, the contact closes, powering up the inverter.

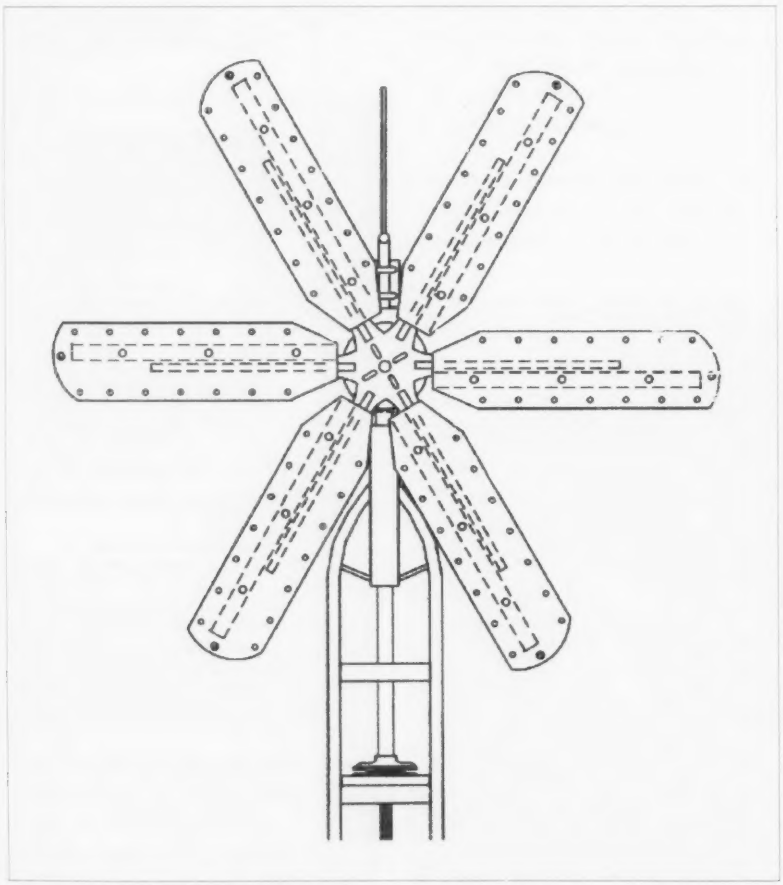

Fig. 5. *Front view of the experimental wind generator with blades assembled and installed.*

Warning! Warning!

Whether you use a generator or an inverter to produce backup AC power, it's extremely important *not* to connect your emergency power to your household wiring! This can create a situation where your power can backfeed into the commercial power grid, and a lineman working on the circuit can be electrocuted. Although special transfer switches are available to isolate your home wiring from the AC mains, they are very expensive and must be installed by a licensed electrician. In addition, most electric utilities require huge insurance policies, a million dollars or more, if you have a transfer switch installed.

A far safer alternative is to simply run a separate circuit for your emergency power. In our installation,

power from either the inverter or the gasoline-powered generator runs into the basement from the garage through a heavy #10-3 cable. In the basement, this cable feeds a small two-circuit fuse panel, which in turn supplies power to several runs of #14 Romex. Each run of Romex crosses the basement and passes up through the floor to a baseboard outlet. These are located wherever backup power may be needed ... beside the refrigerator, the freezer, the furnace, and in the radio room. A few emergency lights are also connected, and with the batteries fully charged by Sun and wind, and the inverter wired to auto-start, we have backup power and lights any time the power fails.

Even though there has not been a major disaster since we installed our backup system, it has definitely been useful. The auto-start inverter was on line less than a week before we had a power outage that lasted several hours. The commercial power failed three times in January alone, two of these due to intense lightning storms. (Lightning ... in January?) It's great to have a few lights in strategic places that come on when everything else goes dark.

If there is a good side to the recent violent weather and the looming Y2K crisis, it's that more and more people are becoming aware of the need for disaster preparedness. This has always been a big part of amateur radio, so we've got a significant head start on the general population. Still, when equipping your amateur station, don't overlook other areas that may need attention. Be sure that you and your family have an adequate supply of food, water and first-aid supplies, and an alternative method of heating your home in an emergency. When a disaster strikes, hams are expected to be part of the solution. If your own household is unprepared, you will end up being part of the problem.

For more information

In addition to the ongoing wind generator project, there are many sites and articles on the Internet devoted to alternative power. I've linked as many as I could find to my Web site [www.bioelectrifier.com] to help start your search. You can also click on a hot key while you're there and send me a note via E-mail. Of course, you can also reach me by "Uniformed Government Employee" at the address listed at the top of this article, but please include an SASE.

Sources

Northern Tool (formerly Northern Hydraulics) is a good source for gasoline engines, generators, solar arrays, inverters, and even wind generators.

Northern Tool
P.O. Box 1499
Burnsville MN 55337
(800) 533-5545

Harbor Freight Tools is a liquidator for all sorts of useful equipment. You can often find gas-powered generators and engines here at a very low price.

Harbor Freight Tools
3491 Mission Oaks Blvd.
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J.C. Whitney has probably printed more automotive equipment catalogs than anyone on the planet. They're a good source for alternators and 12 volt DC accessories.

J.C. Whitney
P.O. Box 3000
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Fair Radio Sales is a familiar name to most hams. Among the goodies to be found here are several types of DC motors suitable for wind generator experiments. They've also got a good selection of large power resistors, rheostats, and meters.

Fair Radio Sales Co.
P.O. Box 1105
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Edmund Scientific is a source for high-quality solar panels and quite a few other hard-to-find parts. The lazy Susan bearings used in the wind generator project came from Edmund.

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Not so long ago, when I swapped my automobile, my spouse firmly put her foot down and said, "You're not going to drill holes in the roof of *this* car." Fortunately, a friend who was a CB operator (and now an amateur) had traveled this path before and come up with a solution.

A rigid and slightly bowed length of aluminum strip was fastened across the roof and clamped in place to the roof gutter with grips and stainless steel screws. The width of the strip was slightly over three inches, and it was approximately one and a half millimeters thick. The curve and bow tension gave a clearance of just under two inches from the roof. This height allows a standard CB antenna base to be fitted with room to spare. Coaxial cable (RG-58CU) was fastened to the strip with ties and then fed back through the rubber surround on the rear door to the interior of the vehicle.

Rubbing my hands with glee, I proceeded to check my VHF and UHF whips for resonance. The smile didn't last long, as my favorite antennas now exhibited high SWR. This was a classic example of an inefficient ground plane. I knew the whips were resonant from previous use, so the conclusion was a simple one. However, what could be done about it was a vexing question.

On two meters, I decided that a resonant ground plane should solve the problem. A length of aluminum strip three quarters of an inch wide was cut to a length of 40 inches. To test the theory, it was given a slight bend one and a half inches on either side of center and clipped as close to the antenna base as possible with a couple of crocodile clips. It appeared as though the car roof had sprouted wings!

Tests on my two meter antennas now gave a very low SWR similar to results previously achieved with my former hole-in-the-roof mount on the old car. If you refer to **Fig. 1**, you will see a diagram of the final two meter ground plane. The original bends were made at right angles, and then one inch farther along another right angle bend made the wings parallel to the roof support. Two stainless steel screws were used to permanently secure the ground plane.

I later found that when the car was in motion, the wings tended to flap. Thus the ends were secured by two pieces of one-inch-diameter plastic conduit. These had a slot for the ground plane and were secured to the roof mount and ground plane with silicone glue.

Testing my UHF antennas, both amateur and (Australian) CB, still showed high SWR at the resonant frequencies. I decided that two more sets of "wings" was not really the way to

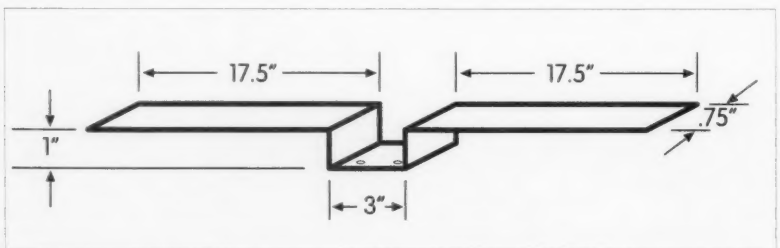

Fig. 1. *The shape of the two meter ground plane.*

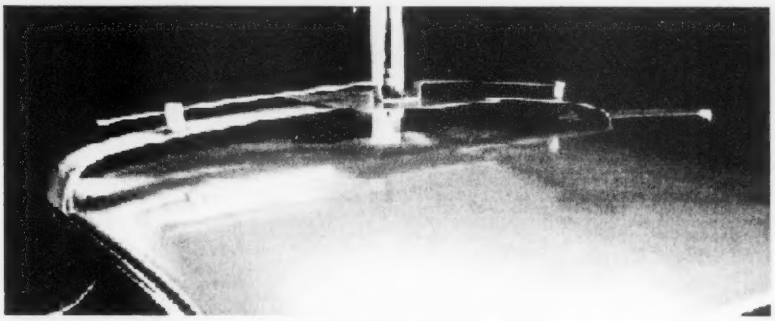

***Photo A.** Roof mount with both ground planes.*

go in solving this problem. After due consideration, I settled on a square aluminum plate. The theory of this is that the side of the square should be smaller than a half wave at the highest frequency used. Also, the diagonal size needed to be longer than a half wave on the lowest operating frequency. This meant that the ground plane would be efficient for any frequency between these two limits.

A square of eleven and three quarter inches would allow a diagonal resonance of approximately 355 MHz and a side resonance of approximately 503 MHz. Thus this ground plane, covering 355 to 503 MHz, would be adequate for both of the frequencies that I wanted to use for mobile operation. This plate was fastened by the CB base to the roof support as well as the two screws for the two meter "wings." You can see this in **Photo A**. Theory worked in practice, and now all my mobile antennas, VHF and UHF, exhibit a low SWR. 73

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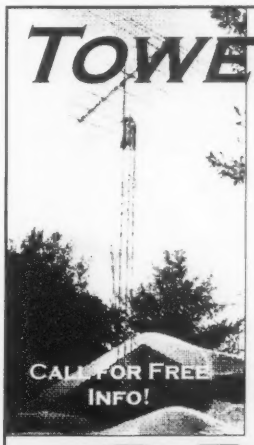

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Regens for the Millennium

Part 2: Winding coils.

Al Cikas KA9GDL
412 Radford Drive
Sherman IL 62684

Last time, we presented a feature on the typical regenerative shortwave receiver. *(Be sure to see Update in this issue. — ed.)* In it, some rudimentary instructions were given for winding a basic shortwave coil. Readers who have an interest in such a project will be delighted to learn that spending just a few minutes with a calculator will allow them to narrow the coil ranges to any desired portion of the radio spectrum. By combining two fairly simple formulas into a set of program steps, it is possible to accurately predict, usually to within 100 kHz, the properties of a home-brew single-layer coil. Recall that the coil requires a tune winding and a smaller tickler winding.

First we take a look at the formulas. This first equation is used to calculate the inductance value (the number of microhenries) of the tune coil winding:

$$L = \frac{r^2N^2}{9r + 10L_2}$$

Explanation of the formula is as follows:

L is the inductance in microhenries

r is the radius, or 1/2 the diameter of the coil

N is the number of turns of wire in the tune winding

L_2 is the length of the tune winding, bottom to top

Note that both r and N are squared in the numerator, while r and L_2 are each multiplied in the denominator.

Technical hint: When using a formula such as the one above, *always* calculate the denominator *first*. The results can be placed in your calculator's memory. Then, when you calculate the numerator, simply divide by Recall Memory and the formula will be presented neatly while saving a few keystrokes.

Let's assume that we have a commercial shortwave coil that covers 2.9 to 7.3 MHz, and we want to evaluate this coil using the formula. The coil measures one and one-quarter inches in diameter, so we divide by 2 to get the radius. 1.25 divided by 2 yields a 0.625-inch value for the radius. This value needs to be altered only if other sizes of coil forms (pill bottles, cardboard, plastic, etc.) are used.

The commercial coil consists of 23 turns of wire occupying three-fourths of an inch in length on the coil form. Again, we ignore the 4-turn tickler for now, so in the denominator we calculate 9 times the radius (9 times 0.625) and 10 times the length (10 times 0.75). When we get those numbers, we *add* them together and that becomes the denominator, which is stored into your pocket calculator's memory. Thus 9 x 0.625 = 5.625 ... 10 x 0.75 = 7.5 ... and 5.625 + 7.5 = 13.125 ... This is the denominator, and its value is stored in memory.

Now we tackle the numerator. Simply square the radius, r, then the number of turns, N, and *multiply* those values. Thus 0.625 x 0.625 = 0.390625 ... 23 x 23 = 529 ... and 0.390625 x 529 = 206.64. Note that the type of calculator you use may alter some of the decimal points and give slightly different decimal results.

What remains is to divide this numerator (206.64) by the value of the denominator still in memory (13.125), which yields 15.74 microhenries, completing the first of our two formulas. Again, note that we *add* items in the denominator but *multiply* items in the numerator. The resulting value of 15.74 microhenries gives us the characteristic inductance of the coil tune winding.

To calculate the frequencies this particular coil might cover, we use a

second formula that depends on the results of the first formula to continue. This second formula is worked in a similar set of steps:

$$F_{kHz} = \frac{1,000,000}{2\pi\sqrt{LC}}$$

In this formula, L is the value of 15.74 microhenries carried over from the first formula. 6.28 is derived from two times the value of π (3.14159) and can be limited to 2 decimal points, or 6.28. The numerator can be one of two values, 1,000 for MHz or 1,000,000 for kHz, depending on which part of the spectrum you are tuning for. Use 1,000,000 for longwave and BCB coils, and 1,000 for shortwave coils.

Notice that we have left a couple of items of unfinished business in the denominator. First, we need to find the value of C. This is actually a pair of values, and we'll need to run the entire formula twice, once for the low end of the tuning dial, and again for the high end. This will yield the entire tuning range for the coil. The value of C is measured in picofarads and is typically a maximum of 365 pF for the low end of most broadcast types of capacitor. The high end is typically 50–100 pF, so we'll estimate 50 pF for the high end in this formula. Finally, when L and C are known, we first multiply them, then take the square root of that value, and multiply by 2π (6.28). That result is the denominator, which is stored into memory.

For example, let's use L = 15.74 microhenries and C = 50 to 365 picofarads. We'll do the low end first: 15.74 x 365 = 5745.1, the square root

Continued on page 24

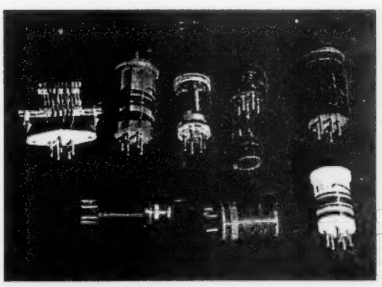

***Photo A.** Home-brew coils for a regenerative receiver. Note toroidal version, center right.*

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18	0.041
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22	0.026
24	0.021
26	0.016
28	0.013
30	0.010

Table 1. Wire specifications.

of which is 75.7964. 75.7964 x 2π (6.28) = 476.00, which is stored in memory.

Now simply enter 1,000 and divide by recall memory, and you'll get 2.1 MHz as a result. Note that the original coil tunes from 2.9 MHz, so the capacitor in the commercial receiver must be something other than 365 picofarads. 300 picofarads works well here.

Calculation for the high end of the coil is done in exactly the same manner. We just use the formula a second time: 15.74 x 50 pF = 787, the square root of which is 28.0535. So, 28.0535 x 2π (6.28) = 176.176, again stored in memory.

Dividing this number into 1,000 gives a value of 5.67 MHz, which is too low, suggesting the real value of the tuning capacitor is closer to about 30 picofarads. Using that value in the formula once more yields a high end of 7.33 MHz, which is very close to the 7.3 MHz value printed on the coil.

It might be useful to mention here that even if the values of the tuning capacitor are known precisely, other capacitances in the circuit stemming from wires, the bandspread control, and the antenna tuning capacitor will introduce small amounts of error. Even with these errors, the formulas can be adjusted to limit the results to within 100 kHz of actual performance. Thus, the reader could wind this same coil and arrive at, say, 2.8 to 7.2 MHz (or even 7.4 MHz). By adding or deleting a winding or two, a home-brew coil could be constructed to certain specifications; examples would be to add WWV at both 5 and 10 MHz or to include two amateur bands in the same coil (40 and 80 meters, perhaps).

If a signal generator and frequency counter are available, actual performance of a home-brew coil can be assessed, and the values of C can be more narrowly defined.

When evaluating several coils, you may have to settle on a pair of average values for C that agree with all coil sets. If this method is used, set the bandspread capacitor to the center of its range and leave it there. Use the bandspread to tweak out the last few kHz on either end of the tuning coil, but don't include those values when you mark the coil range on the form. Know also that one home-brew regen

FORMULA 3

This formula is an inverse of the first formula presented. It allows for calculation of the number of turns on the coil if the inductance L is already known.

$$N = \sqrt{\frac{L(9r + 10L_2)}{r^2}}$$

Since the first formula is explained in such detail in the text, this one is presented for reference only. Use the L value of 15.74 in this formula for an example.

Special note: L_2 is usually shown as a lower case L in most formula books, but was presented here as L_2 for clarity and ease of manipulation, especially if computer methods are employed.

Cosmetic Cell Entries	
B3 Coil diameter in inches	B18 Low end
B5 Number of turns	B20 High end
B7 Length of turns	F3 Radius r
B10 Tuning capacitor	F5 Radius r squared
B12 Low end	F7 9 * r
B14 High end	F10 Coil, microhenries
B16 Band tune	
Calculation Cell Entries	
D3 Entered by user (in.)	D20 (1000/g20)
D5 Entered by user	Note that D18 and D20 can use 1,000,000 for kHz coils
D7 Entered by user (in.)	G3 +d3/2
D12 Entered by user (365 pF)	G5 +g3 * g3
D14 Entered by user (50 pF)	G7 +g3 * 9
D18 1000/g18	G10 [+g5 * (+d5 * d5)]/[+g7 + (d7 * 10)]
Scratchpad Math Cell Entries (no labels, done for clarity)	
G12 +g10 * d12	H14 @SQRT(g14)
G14 +g10 * d14	H16 +g16 * 2 [2 pi]
G16 22/7 [pi]	I13 +g5 * (d5 * d5)
G18 +h12 * h16	I15 +g7 * (d7 * 10)
G20 +h14 * h16	I17 +i13/i15
H12 @SQRT(g12)	

Table 2. Spreadsheet cell entries for the first two equations.

receiver may vary slightly in range for a given coil form, when compared with another model of the same unit.

One last suggestion for the pair of formulas. It is easy to incorporate them into either a computer spreadsheet such as Lotus 1-2-3 or into a BASIC program, either of which can be run and rerun as more coil windings are tried and perfected. Not only can the values of L and C be manipulated, but some significant "What if?" testing can be done before the coils are ever constructed.

For example, coils of different diameters may be assessed, as well as what adding or removing turns would mean. Remember, though, that you will be altering the entire complement of values — in other words, more turns of the same length of wire on a smaller-diameter form will add length to the coil winding, and so on. Make sure to take this into account as you explore the new possibilities on your computer screen.

Table 1 shows wire sizes. In counting the number of turns on a coil of a given length (here the diameter/radius values are ignored), simply use the wire size closest to the decimal value found by dividing the coil length by the number of turns. In our example of the original commercial coil, we find 23 turns of wire stretched over 3/4 of an inch, giving us a wire diameter of 0.032 inch (0.75 divided by 23), or a wire gauge of 20. Since home-brew methods will be less than precise, use the gauge that corresponds to the closest wire size on the table. For example, if your calculations call for 75 turns of wire on a form measuring 0.825 inch in length, the wire size will be 0.011 (.825 divided by 75) which comes close to 30 gauge wire on the table. A third formula is given at the end of the article which may prove helpful here. Note also that none of the formulas presented here requires wire sizes, which is the beauty of this whole process.

Table 2 shows a sample of a spreadsheet that will display the method I use to evaluate home-brew coils.

The regenerative receiver makes a good first project, as well as a test bed for more experimentation, and the results can easily be transferred to other projects such as other receivers, a QRP transmitter, or a tester for determining variable capacitor values.

The spreadsheet (or BASIC) calculations can be very useful in setting up coil forms to cover a specific range, or for evaluating the theoretical limits of a receiver's reception. As an example, by using the above formulas or spreadsheets, you can determine that exactly 100 turns of #30 on a diameter of either 1 or 1.25 inch(es) will cover the broadcast band from 0.5 to 1.5 MHz (plus or minus a few kHz). Thirty-gauge wire can be difficult to work with, but 100 turns is attainable fairly easily.

For longwave coverage, some 200 to 300 turns of 30-gauge wire are needed. Checking the formulas once again, we see that the theoretical limit bottoms out at about 200 kHz for a 365 picofarad capacitor. Much below 200 kHz, a much greater effort is required to wind a coil using 30-gauge or thinner wire. Although 190 kHz may be attainable, 150 kHz would be nearly impossible. Somewhere slightly below 200 kHz, the coil design reaches its theoretical limit of coverage and cannot go any lower without a complete re-design of the receiver. We simply run out of room on the coil form to add any

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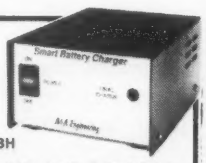

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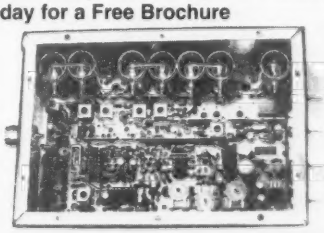

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more turns. The same limitation is true at the high end, but for a slightly different reason. At approximately 12 to 15 MHz, the ability of the coil to detect weak (or even moderately strong) signals drops off rapidly. While the formula still holds true, the real physics inside the detector tubes start to fail. Thus a VHF version of the receiver would require a special VHF tube, such as a 6AK5. This means that coverage of the 30–50 MHz public service band or the 118–136 MHz aircraft band is theoretically out of range of the normal shortwave receiver. By the time all of these conditions are compensated for, you no longer have a regen of the original design.

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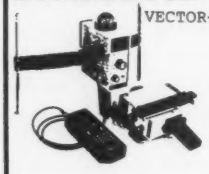

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Tickler time

Now we turn our attention to the tickler winding necessary on each of the coil forms. A good starting rule of thumb is 4 turns of tickler winding for every 10 turns of tune winding. If the ratio of tickler to tune windings is correct, the unit will receive signals across most of the band, with the regeneration control advanced only about a quarter of a turn from minimum. In other words, if the regeneration knob is set for minimum at the seven o'clock position, almost all stations should be received with a setting of between eight o'clock and eleven o'clock maximum. Only rarely should the control be advanced beyond this point.

If the regeneration control must be fully advanced, there are too few turns of tickler winding and more wire will have to be added, usually starting out with a longer piece of wire. On the other hand, if the regeneration control is too touchy at the minimum end, the tickler winding is too long, and needs to be shortened. Generally the tickler winding is made of the same gauge wire as the tune winding, but this is not critical. Experimentation here with various wire sizes may prove interesting.

Additionally, it is possible to construct multiband coils for the regen receiver, using a variety of techniques:

(1) Use a miniature toggle switch to short out the top 3 or 4 windings of the shortwave coil. This will have the effect of raising the coil tuning frequency. The switch can be mounted at the top of the coil form, yielding a 2-band coil.

(2) Use a miniature toggle switch to jumper additional sections of the tuning capacitor into the circuit. This has the effect of lowering the tuning range. This switch is soldered onto the tuning capacitor if it has more than one tuning section.

(3) Wind a coil consisting of several gauges of wire on one form, with a tap at each junction. Remember the adage that all radio builders use, "Many turns fine wire, few turns heavy wire." (This adage is used universally in winding solenoids, relays, step-down transformers, etc.) Start at one end with about 80 turns of 30-gauge wire, then switch to about 30 or 40 turns of 24-gauge, then about 12 to 15 turns of 20-gauge, and so on. This multi-gauge winding will negate the formulas previously given, but with a multiple-position rotary switch you will be able to add bandswitching to your home-brew receiver. This switch may be mounted on the coil form itself (I used a pill bottle to house both the coil and the 4-position switch; they can also be mounted at a convenient place on the front panel of the receiver). With a little experimentation, you can adjust the multiple windings (or simply the next plug-in coil form) to pick up coverage where the last one leaves off.

I should mention that most capacitors are very nonlinear in their coverage of any given band. If we take the commercial coil as our example, we will find that as we tune up the band from minimum to maximum we see coverage that looks something like this:

2.9 . . . . 3.0 . . . . 3.4 . . . . 4 . . . 5 . . 6 . 7 MHz.

Be sure to design your home-brew coils with the most desired portion of coverage at the lower end of the band. About the only realistic exception here would be to put a very strong station such as WWV (at 5.0 or 10.0 MHz) near the top of the tuning range, and separate all the other reception down at the lower end of the tuning range. The formulas will prove helpful here.

Finally, if 4- or 5-pin coil forms and sockets cannot be located, 8-pin octals may be substituted. This leaves plenty of pins for a multiband coil. Also, the 8-pin plug can be easily attached to common pill bottles, providing a wealth of coil forms to use for experimentation. 73

You, Too, Can Be an SOB

Hams should be heard but not seen—put your left hand on the Callbook *and repeat after me ...*

Guy Slaughter K9AZG
753 W. Elizabeth Drive
Crown Point IN 46307

As president and organizer of a new fraternity aimed at recapturing the traditional policies of hamming, I invite those few remaining radio amateurs who shun personal contact with other hams to join an international net known as the "Solitary Operators' Brotherhood."

We are not to be confused, however, with chronic QRMers sometimes referred to by our initials. When you hear an irate operator saying, "Sorry, Charlie, I missed your QTH on account of them SOBs was tunin' up on you again," the chances are he is not referring to one of us.

We legitimate SOBs, whether or not we use dummy loads, have banded together to preserve and perhaps rebuild what has become a dying subculture among amateurs. We offer an alternative to hamfests and club meetings and picnics and eyeball get-togethers of all kinds, because we share one fierce conviction: We believe in communicating with our fellow hams, but not in mingling with the buggers.

Hamming is for chatting from a distance, we think. It is for exchanging thoughts, ideas, information—even for sharing emotions—with strangers out there in Radio Land whom we cannot see and by whom we cannot be seen.

Because they are invisible to us, we perceive those we contact as perfect creatures, handsome, wholesome, witty, wise, paragons of beauty, knowledge, and virtue. And because we are invisible to them, we can assume their perceptions of us are equally inaccurate.

This pleasant state of affairs exists, of course, only for as long as we avoid physical contact with each other. It instantly evaporates if and when we visit each other's shacks or eyeball each other at club meetings, hamfests, banquets, flea markets, or any of the myriad of similar illusion-destroying social events at which non-SOBs congregate. For who can deny that to meet a fellow ham—any fellow ham, every fellow ham, however delightful his/her voice, whatever the perfection of his/her on-the-air manners—is to be disillusioned, to discover that he/she is, like the rest of us, a scruffy mortal with a runny nose, rumpled clothes, and scratches on his/her gear.

Despite this obvious truth, the tendency among most radio amateurs today is to socialize, to congregate, to mingle. And that is fine for those who so enjoy the emotional reinforcement of flocking together with birds of like feather—they don't mind the disillusionment it inevitably brings.

But the Solitary Operators' Brotherhood was organized for those of us who think it more appropriate to emulate the pioneers of our hobby. Those giants of spark and coherer or catwhisker days sat alone in attic and basement, history tells us, tinkering up QSOs with other weirdos in other garrets and other cellars, blocks and even miles away. That was the golden age, as we SOBs see it, the era of hermit hams, of non-gregarious gadgeteers, of antisocial pseudo-scientists who loved their Leyden jars and revered their varicouplers, but hated interruptions and despised company.

Today, we of the Solitary Operators' Brotherhood have readopted that ethic. We contend that, while other hams have interests akin to ours, all hams are strange by definition, some even stranger than we. We feel very strongly, therefore, that hams should never congregate

Continued on page 41

Reprinted from *73 Amateur Radio*, February 1987.

Number 28 on your Feedback card

The Ten-Tec 1254

Fifteen programmable memories enhance this microprocessor-controlled receiver.

Mike Bryce WB8VGE
955 Manchester Avenue SW
North Lawrence OH 44666
[prosolar@sssnet.com]

There it was. "Hello, Americans. This is Paul Harvey. Stand by for news!" Those where the first words I heard coming out of the headphones on my brand new Remco crystal set. In fact, the only station I could hear was the local AM station, WHBC, and the last thing I wanted to hear was some new guy named Paul Harvey. I recalled my first experience with radio with a smile as I was unpacking the newest kit from Ten-Tec. It's their model 1254 communications receiver.

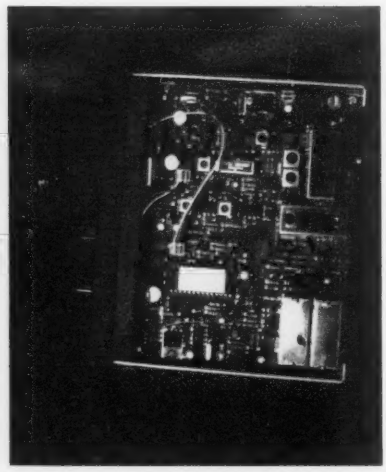

Photo A. *Inside the Ten-Tec receiver. Notice the clean layout of the PC board. All major components mount on this one PC board. There is a smaller PC board that holds the display components.*

The Ten-Tec 1254 covers 100 kHz to 30 MHz. Depending on the mode of operation, you can move from one end of the band to the other in either 2.5 kHz steps in SSB or 5.0 kHz steps in AM mode. If you're in a real hurry, a push of the fast button increases tuning steps to 100 kHz. A "Clarifier" control provides ±1.5 kHz fine tuning for CW and SSB modes. The clarifier also works in AM mode, too. You know where you're at with the bright green six-digit LED display, and several LEDs provide feedback for the mode and tuning speed.

This receiver is a dual-conversion design. The first IF is 45 MHz and the second is 455 kHz. Selectivity is specified as 4 kHz @ -6 dB. Sensitivity is 2.5 µV for 10 dB SNR at 30% modulation in AM mode, while the SSB mode specs out at 0.5 µV for 10 dB SNR.

Signal flow

The RF input from the RCA antenna jack is routed to an input bandpass filter to improve image response. From the filter, the signal is dropped into the first mixer being fed by the first local oscillator. The first local oscillator is controlled by the microprocessor. The microprocessor is an 8-bit custom-programmed PIC 16C57. This processor also controls the display board and the LEDs.

After the first mixer, the crystal filter removes the unwanted signal and the desired signal is amplified before being sent on to the second IF at 455 kHz. The second local oscillator operates at 45 MHz and is adjustable via the clarifier control. Our signal, once again amplified, is sent to a 455 kHz ceramic filter, two IF amplifiers, and then to either the AM detector or the product detector. An AGC line controls a front end attenuator to keep the audio output constant as signals fade in and out. The audio amplifier will produce up to 1.5 watts of power. Audio is available from the top-mounted speaker or from the headphone jack. This is all done with 10 ICs, 26 transistors, and 16 diodes. All of these devices require 250 mA with no signal. A 15 VDC at 800 mA wall transformer supply is included to power the Ten-Tec 1254; an internal 9-volt battery holds the memory locations when you power down.

Building the Ten-Tec 1254

As with all the Ten-Tec kits, the 1254 is assembled in phases, or as I like to think of them, as sections. The 1254 assembly takes about seven phases from opening the box to tightening the last screw. Ten-Tec reports that the average assembly time will be about 25 hours. In my case, and I've

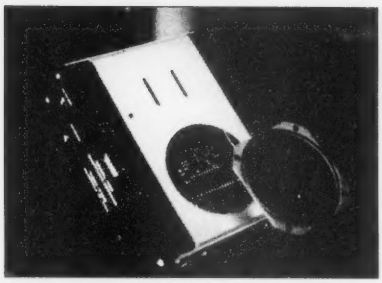

Photo B. No *holes punched in chassis to mount the speaker to. Ten-Tec wants you to glue the speaker in ... hmmm ...*

melted a lot of solder in my day, it took me two evenings, or about eight hours.

As with every kit I've ever assembled, the toughest part for me is cleaning up the workbench! Since my wife works on Saturday night, I armed myself with a case of cold Diet Coke®, a ten pound bag of Oreo® cookies, solder, and oldies on the radio. With four cats watching the entire assembly process, I was all set for a night of kit building!

The manual is clear and easy to understand. The manuals from Ten-Tec seem to get better with each new kit they produce. It's spiral-bound so that it lies flat on the workbench, and contains numerous full-size drawings and schematics.

There are a lot of parts inside the 1254. There are two PC boards, one for the display and the other for the receiver. Both PC boards are double-sided with plated-through holes. Ten-Tec mentions several times in the assembly instructions that a misplaced part will be difficult to remove from the PC board. The PC boards have all the part legends clearly silk screened on them.

Photo C. *The assembled rig is small enough to travel with. Comes with its own wall power supply.*

Assembly begins with the display board. Here, the parts for this phase are enclosed by themselves. You don't have to wade through all the parts in the kit to find just the ones for this PC board. This is a nice touch from Ten-Tec and I wish they would extend this thinking down to the phase level, packing all the different phases into separate bags. Yes, I know that would increase the amount of labor needed to kit up the 1254, but perhaps it might be worthwhile from the builder's standpoint.

Basically, the display board contains the display (duh!) and the various switches to control the microprocessor. The parts are very small—1/8 watt resistors are used, and attention to detail is required to stuff this PC board. After the display board is completed, work begins on the main PC board.

The main PC board contains both the RF and the microprocessor sections. In fact, the microprocessor and PLL sections are the next phase of assembly.

The microprocessor is the only part of the 1254 that uses an IC socket. You do not want to install sockets for any of the other ICs. In RF design, adding a socket might muck up the works. With the microprocessor and PLL sections completed, this entire section, along with the display board, may now be tested. This is one aspect of building a Ten-Tec kit. You know from the start if the kit will work because you complete and test each phase as you go. When I powered up the 1254 for the test, everything kicked right in. Although you can't do anything with the display, it was a lot of fun trying out the memories.

Each phase is assembled and tested the same way. You stuff each phase and then conduct the required tests to verify operation. If you follow the instructions, you're guaranteed a working kit when you're done. On the other hand, if you have completed a phase, and the tests prove there is something wrong, you need to fix the section before continuing on. There's little sense to continue to stuff the next section, if you can't get the last one to work.

Continued on page 30

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The Ten-Tec 1254

continued from page 29

Some novel tests during construction

I'm not sure the ARRL would let me use their lab for a weekend to help with the assembly of the Ten-Tec 1254. So, the engineers at Ten-Tec had to come up with a way of generating the necessary test signals to verify the operation of the different sections. In one particular section, you're asked to dangle a clip lead across the display board. The idea is to have the receiver listen to the multiplex signals generated by the microprocessor. That's a slick idea!

The engineers at Ten-Tec designed into the 1254 a built-in 45 MHz test signal. In real life the frequency synthesizer can't tune below 100 kHz. But by pushing a combination of buttons, it will. In the process, the frequency synthesizer is programmed to generate a 45.0000 MHz signal! While not a Cushman station monitor, it works just fine.

Parts are parts

All the components used throughout the Ten-Tec 1254 are prime. No surplus parts are used. The parts are well marked. Also, during assembly if you select a part that won't fit the board, it's the wrong part. This saved my butt once during construction. In my case, I was going to stuff a ceramic cap in the wrong location, but the part did not fit the holes.

The molded inductors, on the other hand, were hard to identify. This is not the fault of Ten-Tec, but of a combination of small parts and paint colors all having the same shade as mud.

There are also several small diodes that were a kicker to identify. Ten-Tec may save their repair department some grief by packaging these diodes by themselves.

Tuneup

The tuneup is rather simple. You follow the instructions and use the built-in test signals to tweak the receiver. I did not find any of the tuned sections to be very tight.

I did find that you will need the proper tuning sticks to fit the transformers. I would suggest to Ten-Tec that they should supply the required diddle sticks. It's just too easy to try to adjust these coils with a butter knife—and thereby ruin them.

There's only one adjustment to make to bring the receiver on frequency. That's easy enough to do. Dial up WWV and adjust the master oscillator until the frequency readout is correct. Not high tech, but good enough for government work.

Nits to pick

All in all, I was very happy with the way Ten-Tec designed their kit. There are a few points that I think they should have addressed.

The one that really grinds my cookies is the fact you have to glue the speaker to the case! This is beyond any mainstream thinking—especially since Ten-Tec is known worldwide as a manufacturer of electronics enclosures. Come on, guys, punch me a few holes and throw in a screw or two to mount that speaker!

And don't put down that glue bottle yet! There are a few other places you need to add a drop of glue to hold the rig together, too. That's tacky!

On the air

The 1254 is about as simple to operate as you can make a receiver. You get the usual on/off and station selector. There's an AGC circuit that works quite nicely, and of course you know where you're at with those big LEDs used in the display.

You move around the bands by selecting the fast button. This kicks in warp speed at 100 kHz steps. The Memory Write button does just that: It writes the memory location to the microprocessor. The VFO/Memory button toggles between the VFO and the memories. All in all, you can master all the controls of the 1254 in about 10 seconds! It's not a hard radio to work.

So, you may be wondering, how does it work? It's just great! You can receive SSB signals that sound good and the 1254 seems stable enough to decode digital signals, too. There's plenty of audio and the AGC works just fine. Yes, the 1254 does have some birdies, but none seem to be objectionable.

The 1254 is a great rig with which to introduce electronic kit building and hamming to a would-be Novice. Yes, with some hand-holding, a person who has never assembled a kit should be able to build the 1254.

Building a receiver that picks signals out of the air is a moment you'll never forget. After I had the 1254 running, and not even put in its case, I *had* to dial up 1480, WHBC: "... Hello, Americans. This is Paul Harvey. Stand by for news!" *Some* things never change. 73

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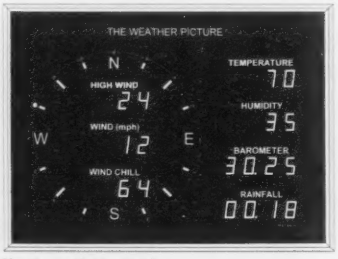

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The Amazing Wiebelfeltzer

This CW filter is semi-analog, quasi-digital, and weirdo-nomic.

Gerald F. Gronson K8MKB
3529 Belinda Drive
Sterling Heights MI 48310

This device is for CW operators. Think back to the days when you were learning to copy CW. Someone was in the same room with a code practice oscillator, sending a clear, easy-to-copy signal.

Remember? Those were the days! No QRM, no QRN, or QSB. Just a clear signal.

Well, sir, now you can have that experience once again (minus the agony of learning) when you get on the air. "How?" you say? The answer is easy. The "Amazing Wiebelfeltzer" device eliminates QRM, QRN, and the like, and makes it sound like the guy you're working is in the same room with you using a code oscillator. (Oh, by the way: It's pronounced "VEE-buhl-FELT-sir," and it's a semi-analog, quasi-digital CW signal processing device. Heck, what else should I call it?)

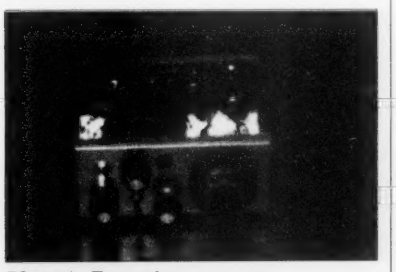

***Photo A.** Front view.*

The unit consists of three main sections: the phase-lock loop; the sidetone oscillator; and the adjustable noise blanker (*400 Ideas for Design*, page 261; adaptation of an article by Edward I. Levy). It runs on 13.8 volts, is easy to build, and works really neat.

The signal enters pin 3 of the PLL, and is changed from a tone into a series of DC pulses. The pulses are inverted by the 2N3904, which keys the sidetone oscillator. The adjustable noise blanker responds to both signal or noise. Sometimes a noise pulse can appear to the PLL as a valid signal and get processed and output as a DC pulse. It would be of shorter duration than a valid signal and trigger the sidetone oscillator. This, of course, would get to be quite an annoyance. This is where the noise blanker comes in. Because for the most part a noise pulse is of much shorter duration than a valid signal, the noise blanker holds the 2N3904 off for a length of time selected by the user. If a noise pulse arrives in between words, or letters, or even between a dit and dah, it doesn't get through. All you hear is the signal you are copying!

The unit can be built on perfboard. Parts placement and layout are not critical, and parts are easy to obtain. It would be wise to house the completed circuit board in a box that is one-and-one-half to two times as large as the box I used—then a power supply could be built in and it would give a greater front panel area. This latter is necessary because most of the controls need to be accessed during normal operation. (I tried to limit the front panel controls to four, but that wasn't practical.) The main frequency-adjust potentiometer is a 10-turn type, which makes a turns counter necessary. R6 in the noise blanker is a 10-turn trimmer, necessary to adjust for variances in 4011s. It may be adjusted to zero ohms in some cases, or set as high as 800 for others.

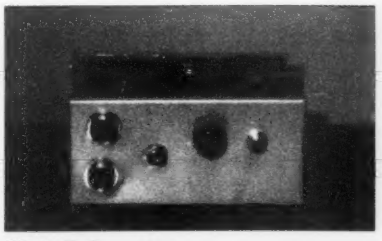

***Photo B.** Rear view.*

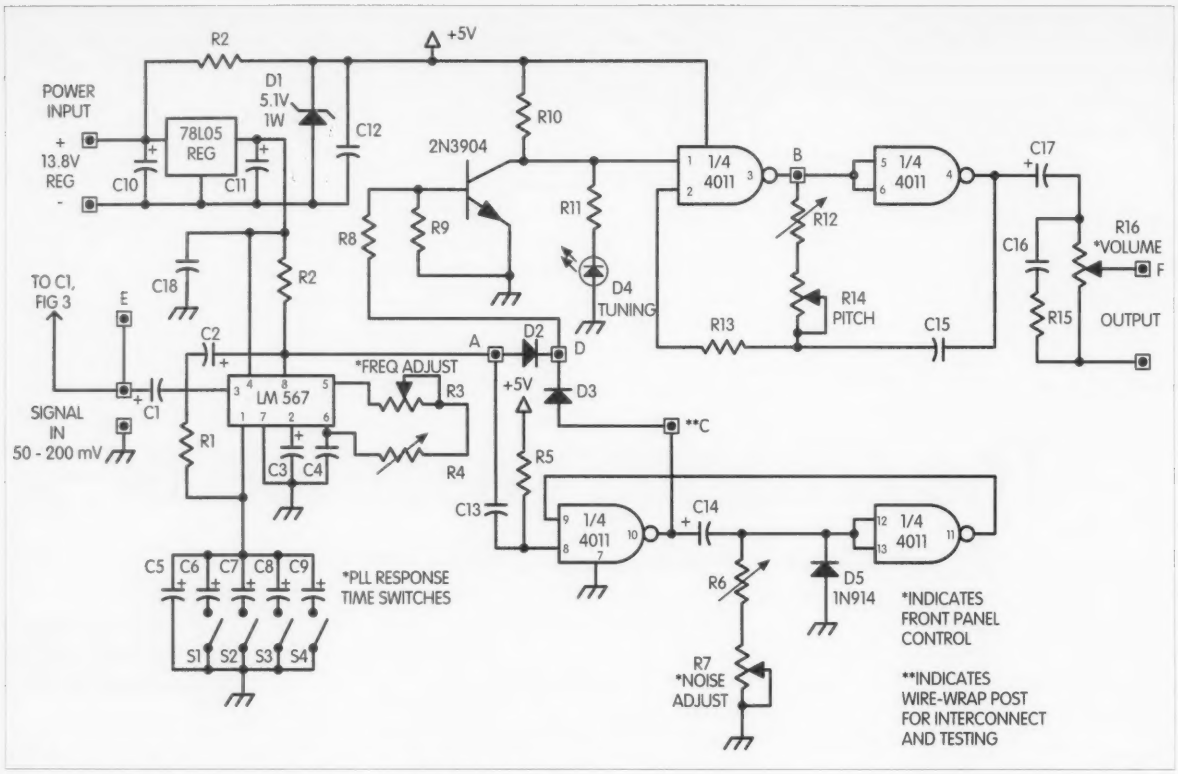

Fig. 1. The Wiebelfeltzer. +5 V connects to pin 14 of the 4011.

A word about the capacitors that are connected to pin 1 of the 567 PLL: Their value at pin 1 controls the response time of the PLL, with a smaller, 0.5 µF cap allowing a faster response than, say, a 4.5 µF one of larger value. This is important because the different combinations of noise and CW speed will be processed quite differently. The *noise blanker* time delay also comes into play as well. With a little use, the operator will become aware of essentially four "ranges" of CW speeds, and where to set the PLL response time and noise blanker settings for best operation.

The Wiebel I built is in a box that measures 5 x 4.5 x 2.5 inches. As I have mentioned, that has proven to be somewhat small, in that it makes for a crowded front panel. I recommend a cabinet up to twice as large. The Wiebel, in some ways, is like a secondary receiver, which will become obvious with use.

It is recommended by the manufacturer of the 567 PLL that the input to pin 3 be in the range of 50 millivolts to 200 millivolts. That would require a receiver with an AGC. In the case of no AGC available, or not enough AGC, use the input conditioning circuit (**Fig. 2**), which should be wired so it can be switched in or out as needed.

A set of stereo earphones should be wired so as to allow raw signal or processed signal in one or both ears.

All parts are of the standard noncritical variety. A glass epoxy printed circuit board should be used for permanent construction. I used perfboard, which allows some experimentation but is more tedious to work with. [If there is enough response, I may make available a kit of parts (minus enclosure).]

All in all, the Wiebelfeltzer does a pretty good job of eliminating the

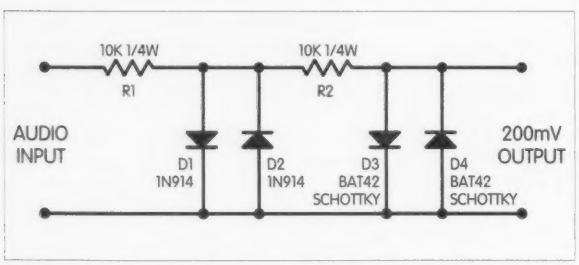

Fig. 2. Optional signal processor. D3 and D4 are Schottky-type BAT-42 or similar. Unlabeled resistors are R18 and R19.

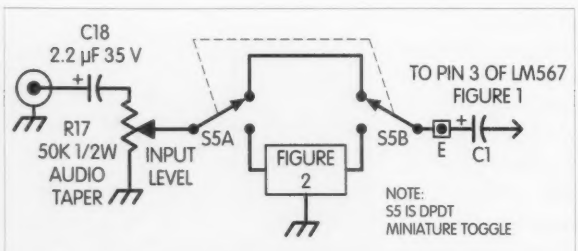

Fig. 3. Unlabeled cap is C19.

Parts List			
C1, C2, C9	2.2 µF 15 V tantalum	R7	10 k lin. single-turn 1/2 W panel-mnt pot
C3	0.22 µF 15 V tantalum	R8, R18, R19	10 k 1/4 W carbon
C4	0.1 µF 15 V tantalum	R9	220 k 1/4 W carbon
C5, C6	0.5 µF 15 V tantalum	R10	150 ohms 1/2 W carbon
C7, C8	1 µF 15 V tantalum	R11	560 ohms 1/2 W carbon
C10, C11	1 µF 25 V electrolytic	R12	15 k 25-turn 1/2 W top-adjust trimpot
C12	33 µF 6.3 V electrolytic	R14	10 k lin. 1/2 W panel-mnt pot
C13	0.22 µF 35 V tantalum	R16	10 k audio taper 1/2 W panel-mnt pot
C14	10 µF 35 V tantalum	R17	50 k audio taper 1/2 W panel-mnt pot
C15	0.047 µF 35 V tantalum	D1	5.1 V 1 W zener
C16	1 µF 35 V tantalum		78L05 +5 V regulator IC
C17	2.2 µF 35 V tantalum		LM567 phase locked loop
C18	0.047 µF 50 V tantalum		4011 CMOS quad 2-input NAND gate
C19	2.2 µF 35 V electrolytic		2N3904 silicon transistor
R1, R13	330 k 1/4 W carbon		LED, red, panel-mnt
R2	1 k 1/4 W carbon		5 x 1N914 silicon diode
R3	2 k lin. 10-turn 1/2 W panel-mnt pot		2 x BAT-42 or similar Schottky diode
R4	20 k 25-turn top-adjust trimpot		4 x SPST switch
R5, R15	360 ohms 1/4 W carbon		1 x DPDT min. toggle
R6	1 k lin. 10-turn 1/2 W top-adjust trimpot		1 pkg wire-wrap posts

Table 1. *Parts list.*

tedium of operating in a noisy, signal-congested situation. This will make for less operator fatigue in most cases.

And why *not* call it a Wiebelfeltzer??

Further reading

Flynn, George. *MOS Digital ICs,* Howard W. Sams, first edition 1975.

400 Ideas for Design, Hayden Book Company, 1976.

Lancaster, Donald. *TTL Cook Book,* Howard W. Sams, first edition 1974.

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Build this QRP rig now — just in case.

Mike Agsten WA8TXT
401 W. Bogart Road
Sandusky OH 44870

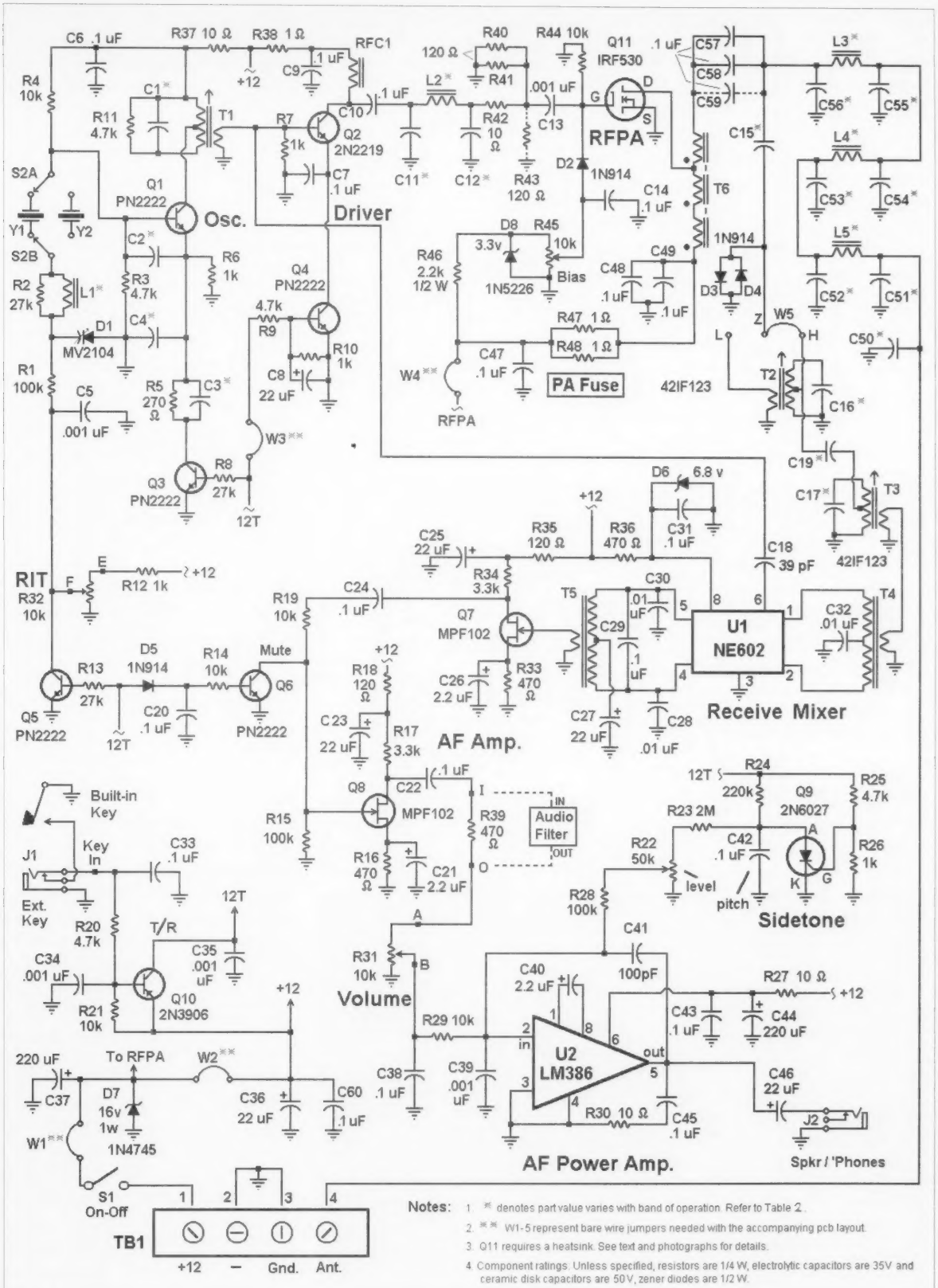
I doubt if I need to tell you why you need a simple, reliable, low-power CW transceiver that can run off a solar-charged 12 volt battery, but if I must, I'll say it in just three words: why two kay! We can't be certain what will happen when the new year rolls around, but in any significant regional or national disaster, it is quite possible that ham radio (yes, you!) will be the last best hope for telecommunications when that house of cards crumbles.

In a short-term disaster, most hams who can will get on the air with big transceivers powered by gasoline-fueled generators. But what about medium- and long-term problems when gasoline is scarce? In that situation, band QRM will slowly die out as petrochemical fuel sources dry up, leaving only those stations equipped with wind, solar, or hand-crank power for battery recharging. And few of them will be running 100 watts or more! Most will be running less than 10.

***Photo A.** Finished version.*

SP-5 Condensed Parts List	
C57–59	0.1 µF 100 V ceramic disc
D1	MV2104 or equiv. tuning diode
R22	Mouser 32AG405 PC trimpot, 50k
R45	Mouser 32AAG401 PC trimpot, 10k
S1–S3	Mouser 10SM002 DPDT slide switch
T1–T3	Mouser 42IF123
T4	16T #28 enam. bifilar wound secondary on FT37-61 ferrite core. Primary is 8T #28 enam.
T5	Mouser TL021 audio transformer
T6	10T #24 enam. trifilar wound on FT50-43 ferrite core. Windings cross-connected in series aiding.
TB1	Mouser 534-4190 4-lug terminal board
U1	NE602 IC
U2	LM386 IC
Y1–2	Fundamental-type crystal in FT-243 or HC17/U or equiv. holder. P.R. Crystals, 2735 Avenue A, Council Bluffs IA 51501, (712) 323-7539; JAN Crystals, 2341 Crystal Drive, PO Box 60017, Ft. Myers FL 33906, (800) 526-9825

***Table 1.** Condensed parts list.*



Notes:
1. * denotes part value varies with band of operation. Refer to Table 2.
2. ** W1-5 represent bare wire jumpers needed with the accompanying pcb layout.
3. Q11 requires a heatsink. See text and photographs for details.
4. Component ratings: Unless specified, resistors are 1/4 W, electrolytic capacitors are 35V and ceramic disk capacitors are 50 V, zener diodes are 1/2 W.

Fig. 1. Schematic diagram.

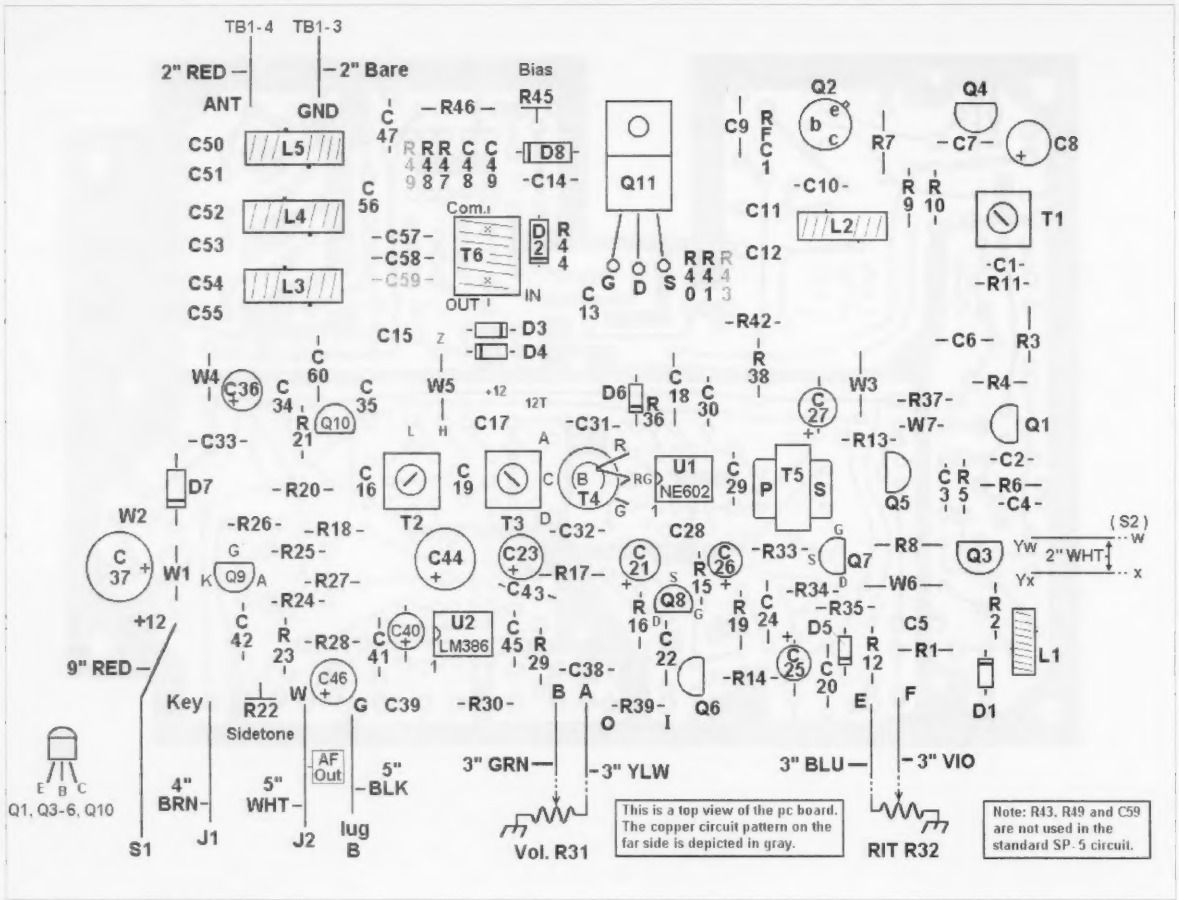


Fig. 2. Top view of PC board.

Big rigs draw a lot of juice, even in receive. It's all that luxurious circuitry that you really don't need, especially when you're not competing with kilowatt-level signals. Choose the appropriate band, put up a good antenna, and low power gets out just fine most of the time. It won't drain your battery nearly as fast. But if your battery is sagging under the heavy traffic load or scarcity of bright sunlight, crystal frequency control will help keep you from chirping too severely, if not transmitting 20 kHz away from where you thought you were! Your sked buddies will still be able to find your signal.

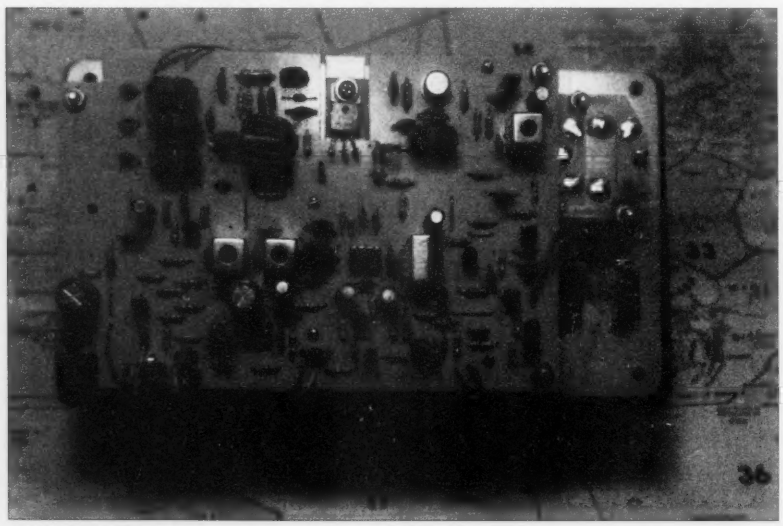


***Photo B.** Stuffed PC board.*

So that's what is offered here in the SP-5 "Senior Spider." It's a simple, stable, crystal-controlled CW transceiver that runs nicely off a small 12 volt battery and operates on your choice of 80, 40, or 30 meters. Power output is in the region of 4 to 5 watts depending on battery charge condition and band (less on 30m, more on 80m). It draws only about 30 mA during receive. Of course, it will also run nicely on a regular AC-powered 13.8 VDC power supply when the lights are on!

If you take a look at the schematic diagram in **Fig. 1**, you'll see that while simplicity is claimed, it is not so simple that performance and operating convenience are sacrificed. Though just one fundamental-type crystal is required for operation (FT-243 or equivalent holder), two may be plugged into the top panel octal socket. This gives you quick QSY from, say, net frequency to a traffic working frequency down the band a bit. Miniature crystals with wire leads also work fine if you can rig a way to plug them in. I modified the base of an unneeded octal vacuum tube to serve as a plug-in adapter for oddball crystals. While the rig is indeed crystal-controlled, you do need fine tuning during receive. This is provided by the RIT potentiometer R32, which varies the voltage on tuning diode D1 in the oscillator whenever the unit is not keyed.

During receive, oscillator Q1 feeds the double-balanced mixer U1 via C18. In terms of sensitivity and immunity to overload, this mixer circuit is far superior to earlier versions I've tried. Antenna signals from TB1 pin 4, via L5, L4, L3, C15, T2, T3, and T4 are mixed down to the audio range in the NE602 at U1. Q7, Q8, and the LM386 at U2 provide audio amplification to a level suitable for headphones or a small, efficient speaker. The type designed for use with a portable cassette or CD player is ideal.

When you close the built-in telegraph key (or external plug-in key, keyer, or bug) to transmit, Q5 grounds the RIT tuning voltage and Q6 mutes the receive audio line. Sidetone generator Q9, a unijunction transistor circuit, feeds the LM386 audio power amplifier so you can monitor your sending. R22 sets the sidetone level and C42 may be altered to vary the pitch. Up in the RF department, Q4 keys the driver stage at Q2 and its output feeds the RF power amplifier, an IRF530 at Q11. Though it just loafs along at this power level, it is nevertheless mounted to a small block of aluminum heat sink which is screwed to the bottom of the enclosure panel—which is also aluminum in the case of the type shown, a Radio Shack #11907656 measuring about 8 inches wide by 5 inches deep by 2-1/2 inches high. Any similar case or box with an aluminum top should

SP-5 Band-Sensitive Component Values

Part. No.	80m	40m	30m
C1, C16, C17	390 pF	68 pF	not used
C2	18 pF	5 pF	not used
C3	680 pF	180 pF	not used
C4	820 pF	680 pF	390 pF
C11, C12	820 pF	390 pF	270 pF
C15	68 pF	10 pF	7 pF
C19	39 pF	7 pF	5 pF
C50, C56	390 pF	270 pF	180 pF
C51	68 pF	not used	not used
C52, C54	820 pF	680 pF	68 pF
C53, C55	390 pF	not used	390 pF
L1, FT37-61 core	40T #30	24T #28	17T #28
L2, T50-2 core	22T #24	14T #24	12T #24
L3, L5 T50-2 core	22T #24	17T #24	14T #24
L4 T50-2 core	25T #24	19T #24	16T #24

Table 2. Band-sensitive component values.

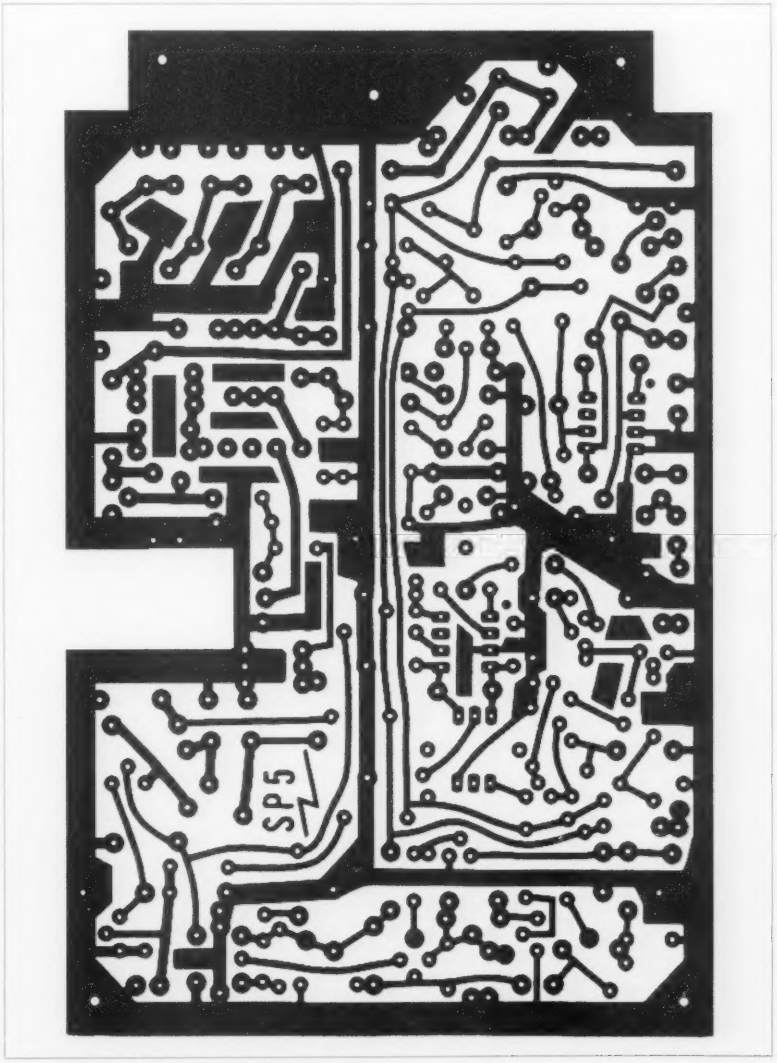


Fig. 3. Full-scale PC board etching pattern.

do the job as well. By the way, that built-in telegraph key is just a brass strip on spacers with a rubber equipment foot for a knob. It grounds the insulated contact below when you send.

Back at the RF power amplifier, bias control R45, a PC-type trimpot, may be set at max for full power or cranked down if you feel less is called for and want to conserve battery. Quarter watt resistors R47 and R48 actually serve in this circuit as cheap fuses. The output impedance of Q11 is stepped up to the vicinity of 50 ohms by T6, an RF transformer consisting of 10 trifilar turns of #24 enamel-coated wire wound on an Amidon FT50-43 ferrite core. L3, L4, and L5, along with associated capacitors, form the antenna lowpass filter, cleaning up the signal before it exits the rig at TB1 pin 4.

Most of the parts for the SP-5 (with values listed on the schematic) mount on the PC board as shown in the parts overlay provided in **Fig. 2** and full-scale etching pattern in **Fig. 3.** Parts with values depending on the band of operation are listed in **Table 2.** After wiring the PC board to the operating controls, jacks, and switches on the top panel, the finished PC board is mounted copper side to the top panel on half-inch metal spacers to be clear of the panel parts below. Short leads from the PC board to crystal select switch S2 may then be made, as well as the short ground and antenna leads to pins 3 and 4 of TB1.

Connect a dummy load and wattmeter to TB1 pins 3 and 4. Connect 12 to 13.8 VDC (with a 1 amp inline fuse) to TB1 pins 1 (positive) and 2 (negative). Key the rig and adjust T1 for maximum RF output. Set bias control R45 to desired power level. Replace the dummy load with an antenna and adjust T2 and T3 by ear for best reception. Or use a signal generator set to the crystal frequency if you have one.

There's an In-Out switch on the cover panel intended for use with any small audio filter module. With two poles on the switch available, one side can be used to select filtered or unfiltered audio and the other can be used to switch on 12 volt power to the filter when it's in use.

Under normal conditions, crystal control may seem like operating with your hands tied even though some of us enjoy that! But if the chips are really down and power hungry high-tech rigs are collecting dust, you may discover how nice it is to be solid as a rock, like a lighthouse on a treacherous coast, while others are drifting around. Crystal up now with your friends and you won't get lost in a sea of noise!

Notes

1. For the latest info on crystal sources, send an SASE to me at the address above.

2. For a one watt "Spider," see the January 1993 issue of *73 Amateur Radio Today.*

3. The SP-5 "Senior Spider" is available as a kit for $69.95 less case, or assembled and tested (indicate band) for $124.95 including case and audio filter. Add $6.00 for shipping to USA and Canada. Order from Lectrokit, 401 W. Bogart Rd., Sandusky OH 44870. E-mail address for questions/comments: [lectrokit@sanduskyohio.com]. 73

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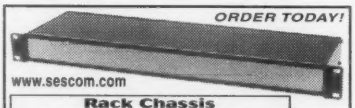

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As a ham with a "big-city" QTH, it's nearly impossible for me to put up an HF antenna of any significant size. Even a compact yagi is difficult, with the small yards typical of southern California homes. An idea came to me as I was spending a summer day on a breezy beach: Why not let the wind hold up a longwire antenna? A few days later, I was operating 40 meters SSB with my "beach kite" antenna!

The trick to getting a simple, inexpensive kite to support several hundred feet of antenna wire is to use lightweight wire. Even very small gauge copper or aluminum wire is heavy, if you use 500 feet of it. I needed wire that was both very light in weight and also strong enough to hold together under the tension of being held aloft by a kite in a brisk wind. Luckily, I have discovered the ideal kite antenna wire: "polywire" (sometimes spelled "poliwire"), a product usually used for electric fences.

Polywire, made by Stafix Electric Fencing LTD and Gallagher LTD, both of New Zealand, is a composite "wire" that is actually mostly polyester. It is about 0.060" in diameter, very strong,

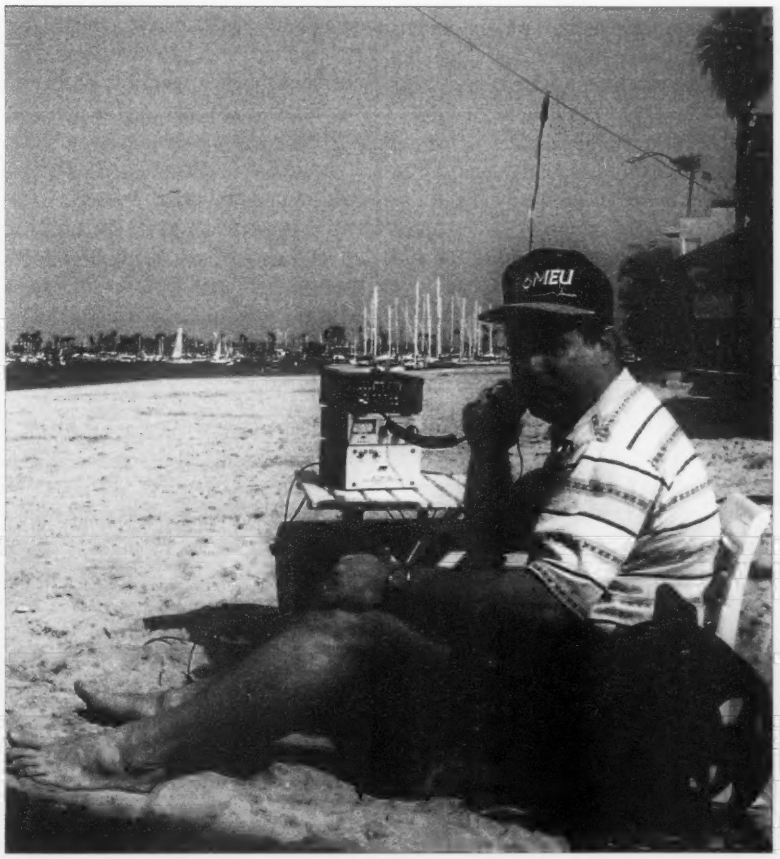

Photo A. *WB6MEU operates from Alamitos Bay at Long Beach CA. Spool of polywire in foreground. (Photo by Ernie Williams WB6BAP.)*

Photo B. *SCG radio, MFJ tuner, and power supply. (This and succeeding photos by author.)*

and very lightweight. A typical 200-meter (660-foot) spool of polywire weighs less than 1 lb. Woven through the polyester material are six strands of thin stainless steel wire, making polywire electrically conductive. The wire strands have a diameter of 0.006", and with a combined diameter of about 0.020", polywire is equivalent to #26 stranded wire. The advantage of polywire is its strength: It is much stronger (but not heavier) than the #26 wire that it supports.

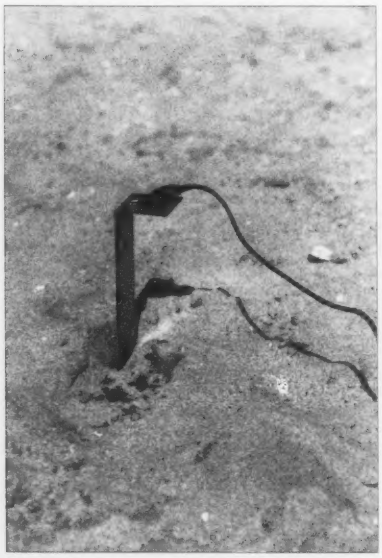

Photo C. *Ground stake connects to tuner.*

Now that the "radiator" problem was solved, I needed a kite to "hook it" to the sky. A trip to the local kite store provided a simple and inexpensive "delta-wing" kite, which cost about $30. The kite has a wingspan of about 5 feet, and is easy to transport. Delta-wing kites are known for their efficiency and stability. They will fly with a minimal breeze and, once aloft, they just "hang in the sky" without zigzagging back and forth. (Having a 500-foot "tail" certainly helps!)

Constructing the beach kite antenna took about 3 minutes, since there wasn't much to build. The only item left to improvise was a means of anchoring the kite to my operating position. I assembled a "bungee-insulator" using a 2-foot length of bungee cord with a snap-ring at each end. One end of the cord would attach to the "radio end" of the polywire; the other end of the cord would be anchored to anything heavy enough to anchor the flying kite. The bungee-insulator also electrically insulates the antenna from the anchor, and provides some mechanical shock isolation to absorb the varying tensile forces on the polywire.

With the kite, polywire (wound onto a plastic extension cord reel), my QRP radio, antenna tuner, batteries, and lunch, I was ready to fly the kite, tune up, and call CQ. A steady breeze was blowing off the Pacific Ocean at Alamitos Bay in Long Beach CA. The kite took off immediately; I let out about 400 feet of antenna wire. The polywire was secured to the frame of my chair using the bungee-insulator. A clip lead connected the antenna to the "longwire" output of my MFJ-971 QRP antenna tuner. A ground for the tuner was provided by pushing a steel "L" bracket into the sand, connected with another clip lead to the tuner's ground terminal. My rig was an SGC SG-2020 multiband SSB transceiver, operating on batteries.

I tuned up on 40 meters; the tuner was able to provide a 1:1 match to the antenna. A few CQ calls resulted in numerous contacts throughout the country, plus a few in Canada! All this on 5 watts of power, SSB ... and no neighbors complaining about an ugly tower

Photo D. *Clip lead connects polywire antenna to tuner.*

or TVI! After a while on 40m, I switched to 20m ... and discovered that the antenna was too long for the MFJ-941 to tune due to excessive reactance (at 400 feet). I wound in the kite to about 150 feet, tuned up, and got a 1:1 match. I worked about a dozen stations on 20m, getting several good signal reports from the East Coast. (One ham had a hard time believing that I was QRP!)

The only glitch was caused by static buildup on the antenna. Every 30 seconds or so, static buildup would cause a discharge across the tuning capacitor in the tuner, resulting in a loud "POP" in the SG-2020 receiver. At worst, this could damage the front end of the receiver; at best, it caused the receiver AGC to knock the audio down by a few dozen dBs each time there was a static discharge. The cure for this annoyance was to install a 1-megohm (1/4-watt) resistor between the Antenna (output) and Ground terminals of the MFJ tuner. The 1-megohm value provides sufficient DC leakage to dissipate the static charge buildup on the antenna, yet it's a high enough value to "bridge" the RF on the antenna without any adverse affect on its tuning or resonance. After installing the resistor, there were no problems with static pops.

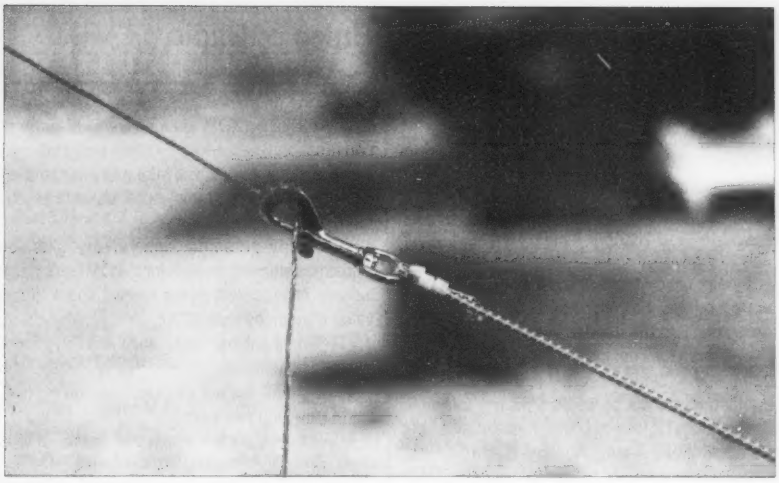

Photo E. *Bungee-insulator secures antenna and isolates it from anchor point.*

Power for the QRP station was provided by a modified MFJ-4114 portable power pack. This unit normally contains ten 1.5-volt "D"-size NiCd batteries, to produce 15 volts of output. The problem I found with this design was that the slightest amount of physical shock would cause the batteries to "spring loose" from their holders. Also, my SG-2020 won't operate well if the supply voltage drops below 12.0 VDC. I fixed these problems by modifying the MFJ-4114, removing the D-battery holders, and installing two 8-volt (3.2 Ah) sealed lead-acid rechargeable ("gel-cell") batteries connected in series (Power-Sonic Corporation, type #832). They provide 16 volts DC fully charged, and allowed the SGC radio to operate for several hours before dropping below the 12 volt limit. The other advantages of these batteries are that (a) they are much more secure than 10 D-cells, (b) they don't have the NiCd "memory effect," and (c) they're more reliable than 10 batteries connected in series with spring connectors.

I have used my kite antenna for over a year now with great results. It's lots of fun operating on the beach ("that's SANDchair copy, OM!"), and my portable station usually prompts a few questions from curious onlookers ... a great way to explain what amateur radio is all about, and why it's more interesting than making a call from a cell phone!

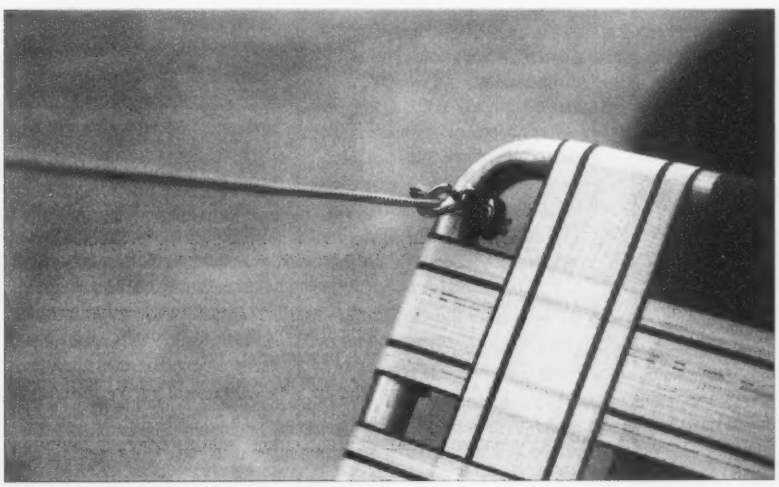

Photo F. *Other end of bungee-insulator is tied to operator's chair.*

Locating polywire can be tricky if you don't live where there are farming materials suppliers. Try calling feed and tack stores, or these polywire manufacturers (Web sites listed in brackets):

Stafix Electric Fence, Ltd.; (530) 743-9045 (located in California); [www.stafix.co.nz].

Gallagher Power Fence, Inc.; (800) 531-5908; [www.gallagher.co.nz].

For batteries, try:

Power-Sonic Corporation; (619) 661-2020 (located in California); [www.power-sonic.com]. 73

You, Too, Can Be an SOB

continued from page 27

in groups larger than one, lest the enormity of our cumulative strangeness become apparent to others or, worse, obvious to ourselves.

The SOB constitution, therefore, requires members to avoid face-to-face meetings with other amateurs. This is our only caveat, and SSTV and FSTV operators are obviously ineligible. There are no initiation fees, no dues, and above all, no meetings to attend. In fact, if any SOB goes to any kind of amateur social affair anywhere, he is subject to instant expulsion. And so compliant with this rule are we that none of us ever has been expelled. "Once an SOB, always an SOB" is our motto.

So how do you join?

Membership is by over-the-air invitation only. Any amateur holding any class of license anywhere in the world is welcomed (SSTV and FSTV ops aside) so long as he swears on the memories of Hertz, Steinmetz, Phelps, and The Old Man himself to abide by the no-meetings rule.

(Phelps, Herman W., ex-1XGZ, for the benefit of those who may not be thoroughly schooled in early amateur lore, was the first licensed ham operator to fracture his skull on an attic rafter while jerking his lip away from an RF arc drawn off a carbon microphone loop-modulating a self-excited 210 on or near 160 meters.)

Continued on page 42

You, Too, Can Be an SOB

continued from page 41

To join, find a member to sponsor you, and vow to avoid personal meetings with other hams (unless you have some in your immediate family; the rules allow limited contact with licensed kin). If he agrees to be your SOB-father, you are in.

So how do you find us?

Just start asking each of your contacts hereafter—on phone, CW, or RTTY and on whatever band—if he is an SOB. Non-members usually will deny it. Now and then you may even run across a guy who'll mutter nasty comments about you and break off the QSO. But sooner or later you will run across a real member of the Solitary Operators' Brotherhood eager to make you one as well.

"Welcome aboard, you SOB," he'll tell you. "Now you are one of us."

And then you will know you have become a real SOB, pledged to carry on the almost-forgotten tradition of the old-timers who labored alone to contrive their magical visits with others out there, unseen, unmet, unrecognized for what they were and what we are today—scruffy humans with runny noses, rumpled clothes, and scratches on our gear. 73

QRX

continued from page 6

but Finagle's Laws on Information apply equally to understanding intricate financial transactions: (1) The information that you have is not what you want. (2) The information that you want is not what you need. (3) The information you need is not what you can obtain. (4) The information you can obtain costs more than what you want to pay.

The difference between rich and poor is sharply caught by Getty's Reminder that the meek shall inherit the Earth—but not its mineral rights. Followed by the Golden Rule of Arts and Sciences: Whoever has the gold makes the rules. Donohue's Law says that what's worth doing is worth doing for money. And then there's Goldfarber's Law, that under any system a few sharpies will always beat the rest of us.

On pocketbook matters, everyone has to keep his eyes open. It's Gross's Law that when two people meet to decide how to spend a third person's money, fraud will result. As in O'Doyle's Corollary: No matter how many reporters share a cab, and no matter who pays, each puts the full fare on his own expense account.

Woody Allen said that the lion shall lie down with the lamb, but the lamb won't get much sleep. To which you may add Clopton's Law: For every credibility gap, there's a gullibility fill.

The Checkbook Balancer's Law holds that in matters of dispute, the bank's balance is always smaller than yours. But if you think the problem is bad now, Epstein adds, just wait until we've solved it.

Finally, Quinn's Law: The reader interest generated by any newspaper column is inversely proportional to the importance of its subject.

Tnx and a look out for Wordsworth's Whim (the better the writing, the greater the chance the author's name will be spelled wrong) to Anrold Smith KA3NTZ, via *X-Mitter,* newsletter of the Penn Wireless Assn., Howard Rubin N3FEL, editor.

Forgotten Rules of English

Several editors have asked for an occasional article on how to improve the grammar in their publication. Here are several very important but often forgotten rules of English, original source unknown:

1. Avoid alliteration. Always.
2. Prepositions are not words to end sentences with.
3. Avoid clichés like the plague. (They're old hat.)
4. Employ the vernacular.
5. Eschew ampersands & abbreviations, etc.
6. Parenthetical remarks (however relevant) are unnecessary.
7. It is wrong to ever split an infinitive.
8. Contractions aren't necessary.
9. Foreign words and phrases are not apropos.
10. One should never generalize.
11. Eliminate quotations. As Ralph Waldo Emerson once said: "I hate quotations. Tell me what you know."
12. Comparisons are as bad as clichés.
13. Don't be redundant; don't use more words than necessary; it's highly superfluous.
14. Be more or less specific.
15. Understatement is always best.
16. Exaggeration is a billion times worse than understatement.
17. One-word sentences? Eliminate.
18. Analogies in writing are like feathers on a snake.
19. The passive voice is to be avoided.
20. Go around the barn at high noon to avoid colloquialisms.

Tnx and happy proofreeding to the ARNS *Bulletin,* Steve Auyer N2TKX, editor.

(And then there was the *73* job applicant who emphasized his skill with "grammar, spelling, and puncuation" ... and the prospective editor who looked forward to meeting us "one of these day"—ed.)

Rules of Radio

- There shall be no talking by the family during a QSO.
- The XYL or XOM shall assist with antenna construction when and *only* when required.
- The shack budget will take precedence over all other incidental items, such as mortgages, food, etc.
- Birthday presents, anniversary gifts, or Christmas stocking stuffers for the OM or YL must include at least two items for the shack (total value of not less than $300).
- Flea markets, hamfests, and Field Days overrule family holidays.
- Furry pets are not allowed near the rig (except for testing purposes).
- TVI never occurs within the home, or if it does, is negligible and does not count.
- All trees around the QTH shall be considered antenna supports, and not "greenery," "landscaping," or other such nonsense. Corollary: Any tree may be cut down, pruned, poisoned, dug up, or otherwise removed, should it be in the way of wire.
- The last postage stamp and envelope in the home shall be reserved for direct QSL mailings, and not for personal letters, bills, or mail orders (unless orders are for shack).
- Any number of holes may be drilled in the family car to accommodate mobile whips. Corollary: Coax may droop across the steering column occasionally.
- Never herewith shall insurance coverage of shack items be less than triple the replacement value, notwithstanding acts of God.
- Newly licensed hams must honor, praise, look up to, ask easy questions of, and purchase coffee for old guys.
- The XYL or XOM shall anticipate good band propagation conditions at all times, and whenever rare DX flows in shall, without fail:

a) keep log when requested;

b) hold all phone calls—except those from other hams;

c) call the OM's or YL's work QTH the next morning and cover an absence with a good excuse;

d) appear very excited;

e) change all plans to suit;

f) provide steaming coffee at 45-minute intervals;

g) cancel all household chores—in particular, vacuuming or lawn mowing.

- All materials owned by the work QTH can and will be used for ham projects. Corollary: If you cannot convince work QTH to donate items for the shack, you shall quit said despicable workplace without notice. Simply QRT hastily.
- These rules may be modified at any time, without notice, to be continuously in the OM's or YL's best interest.
- The most recent licensee must bear the brunt of our collective teasing until the next new licensee fills their humiliated shoes.
- All members of all radio clubs must support,

Continued on page 57

Number 43 on your Feedback card

Above & Beyond

VHF and Above Operation

C. L. Houghton WB6IGP
San Diego Microwave Group
6345 Badger Lake Ave.
San Diego CA 92119
[clhough@pacbell.net]

Looking for Project Gigantic

That's what it is all about—looking for that ARC-5 with the 1625s or whatever type tube it was that could be converted by sawing the Bakelite socket next to pin 3 and separating the cathode and a screen grid of the tube. That was the rage in the early '60s—to get some inexpensive power on the low bands for SSB operation. Remember some of those early rigs using RF and audio phasing to achieve SSB with rather large circuitry and vacuum tubes?

Well, in my case, that was what got me interested in soldering irons and all the destruction that they could wreak havoc on in my early years. It seemed that almost all of the circuits and equipment were too costly for the average amateur to purchase. That led to a plethora of surplus outlets that had material (in large quantities) available for conversion from military usage during the '40s and '50s.

It seemed to be a standard event to travel to these candy stores and see what we could come home with. We sifted through, looking for a familiar and friendly piece of electronics that would lend itself to conversion into something useful that we wanted. High current 28 volt transformers and such were in high demand, as almost all military power supplies used required 28 volts to function. I even remember (before the 28 volt transformer became available) using a large string of 2 volt batteries to power some of the current-hungry behemoths such as the ARC-2 HF transceiver with its motor driven autotune.

If I made a mistake and activated the autotune circuit, it drew so much current that I had to recharge my battery string, as it would suck it nearly dry. Now all of this seems like I am capping on myself, but this is much like all other learning experiences. As Thomas Edison said, "Have I had any success? Why, I know a thousand things that will *not* work." The same is to be said for our stick-to-itiveness in forever scrounging and stocking our junk boxes to save hard-earned cash for that project we want to construct, be it for standard CW or SSB or some other sophisticated piece of gear that could be used to get into RTTY or even ATV.

For RTTY, in the early days there was the military surplus URA-8 converter. This was a premium converter that was costly even when in surplus. That made it a RTTY converter to be dreamt about. A more likely conversion was to assemble a converter out of home-constructed parts using some 88 millihenry old telephone "load" coils to make filters for the mark and space frequencies of 2125 and 2975 hertz. That gave an 850 hertz shift for mark and space, standard in early years.

Not too many years later, 850 hertz was considered old hat, with 170 or even 45 hertz shift being standard in high end systems. Today there are lots of circuits that use these modes, but most utilize high end computers and other types of data networks to pass information on in speeds that run circles around those early RTTY setups.

Enter today's amateur's ham shack, and you'll see that there is quite a technology shift from those early beginnings to the very sophisticated amateur equipment and modes of communications used today. Compare one item that I used, a Hallicrafters shortwave rig using about 9 vacuum tubes in an HF receiver, to my IC-820 dual-band VHF transceiver.

The older receiver could be repaired with a small selection of capacitors and a few vacuum tubes for quick substitution when performance dropped off, or other troubles developed as time went on.

In comparison, the ICOM IC-820: I ordered the service manual and should have taken time to figure out how computer-controlled the entire circuitry was. When looking at the service manual and at the internal circuitry in the cabinet that housed the VHF transceiver, I was disappointed to discover that I was looking more at a computer than at what I call a radio.

Today's radios are so accurate that you do not have to have a frequency counter to maintain them on frequency. They just operate and operate. The biggest trouble is that many years down the road, they might need a battery replacement in the memory hold circuit to keep them ticking. This is different from the old Hallicrafters receiver that I am now trying to restore. Seems the parts procurement program has gone full circle in this arena.

To me, that's what amateur radio is all about: building and repairing equipment for amateur operation *and* repairing test equipment. Now, we all would like to have pockets deep enough to allow our beer budgets to function at a much higher level—similar to where we would be if we had just won the lottery. Unfortunately, that is not the case for me and a lot of other amateurs. That's why we have

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become great scroungers of surplus material.

This should allow you (as it has for me over the years) to stock up on various pieces of electronics to either convert into something or to use for parts scavenging. It's great to stock up the station's junk box to a level that allows you to dig into its depth to locate parts to save you cash in construction projects at the merest hint of an idea, or to test a theory, or to make a simple adapter without having to run to the local candy store and spend not only the gas and time but also the additional cash—making that $2.75 item really cost quite a bit more considering the time and effort needed to get it.

My pitch: Stock the junk box with raw materials as you find them. Don't try to start a museum, but stockpile valid components that can be used to advantage. When you run across small aluminum boxes or cabinets and the price is right, pick them up. Pick up PC boards that have components that can be used for interface or regulator and linear applications.

For interface or driver applications, FETs of a power nature are good materiel to acquire, as are many different types and ratings of voltage regulators. Just this one item can be so handy when constructing small projects. In the linear applications, audio amps, op amps, and such can be quite useful. As far as components to support these items go, stock up on various values of electrolytic capacitors for bypassing and filtering power supply circuits.

Lots of values abound, but 0.01, 0.001, and 0.1 µF capacitors are those most used, in addition to a variety of values from a few pF up to 1000 pF or .001 µF for RF applications. As a general rule, I try to stock up on the little red mica capacitors, as these are a better cap than disc ceramics in most RF applications. In either case, it's just taking what you can locate for little cash investment. You're stocking up a junk box to build things out of, not stocking up Fort Knox.

As far as resistors are concerned, look for a bargain on an assortment or build your own assortment box up. I started out by *not* making a 200 drawer cabinet for my selection of resistors, as then I would be spending more on the compartments to house the resistors than the resistors were worth. Keep the junk box in perspective—it's supposed to save you money. If you only have a small selection, sort them out into 10 different categories according to the last color code band on each resistor.

In this way, you only need 10 compartments to house all resistors. Label them 1 through 5 or so, reflecting the value of the color of the last band, black = 0 for the first box, brown = 1, red = 2 , and so on. This makes the first box values from zero to 99 ohms (fudge and call it 100 ohms). The next box, brown, will be 100 to 1000, and so on. Do you realize that if you sort this way you only need a few boxes, because when the values get into the megohm range, they're not used much. You might as well toss them into the same bin or box. The most common values used are in the 100, 1000, 10k, 100k, and 1 meg ranges, as well as the very small fractional values under 10 ohms.

When you have assembled a larger collection of components and need a better sorting arrangement, try using coin envelopes from your stationery store. A box of several hundred costs only a few dollars. Using the envelopes, I sort all resistors out by value and place similar values in the same envelope, like 470 ohms. All resistors are now sorted by value in these envelopes, making component part selection quite easy.

The same can be said for capacitors and transistors, as well as for both signal and rectifier diodes. If you put your components in coin envelopes, when you sit down to stuff a PC board all you need is these coin envelopes in a few boxes over your workbench to select from. I would not recommend placing very large capacitors in envelopes, as the coin envelopes are only very well suited for smaller components. With larger ones, they become cumbersome due to excessive stuffing (bulging at the seams).

Now there seems to be only one item left in stocking your junk box, and that's where do you find bargain components? Well, this can be a difficult question if you are located in a farming community or other non-industrial area. In many cases, I would rather trade my prime scrounging grounds for a very peaceful farming community any day. In reality, amateur swap meets and some surplus dealers are quite good sources. Just watch what you have to pay for any item. As with any transaction, you have to weigh what use you have for the item with the investment involved. Swap meets are the best places to try to find that pot of gold, that something you are just salivating for, without tipping your hand on how badly you want the item.

If you find the exact item you have been looking for, don't, for heaven's sake, state, "I have been looking for this for 10 years." That will immediately raise the price from reasonable to quite expensive. Swap meets are a blend of the bargain hunters and a few predators selling snake oil. Mostly they are quite honest folks offering for sale items that they have no more use for. Some are in it for a professional business venture and push the prices up. I have observed many transactions occurring early in swap meets as the serious dealers go on the prowl, looking for super bargains and trying to pick up everything that is priced to move cheaply. These items are picked up as sellers are setting up or on the way in. Such buyers rove the drive-in line and ask for specific items before the meet starts.

I have seen these dealers then transport the item to their stall or table and re-offer it at an inflated price at the same swap meet. Here is where you have to watch out for paying too much for an item. You don't know that this dealer has just picked up this, let's say, Tektronics 485 350 MHz dual-trace o-scope for $50 at this swap meet from a neighboring seller. When you are dealing with this dealer, what representations can he make that will be able to truthfully answer your questions about how the scope works? Listen to his responses, such as, "As you can see, it looks to be in great shape. Look, even the calibration sticker, it's only one year old." But has it been plugged in and does it put a trace on the screen? Can you take it and plug it into a nearby outlet and give it a test to see if it's "alive"?

You are in a push-pull scenario of events here. In this case, I would say that if the unit is alive, what is the cost and can I perform a quick test? Some security for both the seller and buyer is quite reasonable. Most sellers who do not know me have accepted my driver's license info copied to a business card as security for a 10 minute test. Some have wanted cash to hold things until I return.

Here is where the interest in the item and the mutual trust between seller and buyer need an evaluation. I have only been bit once, but it's quite enough. I returned with a test set that did not function and for which I had paid a premium price—and the dealer was gone, never to be seen again. I suspect that a check that could have been stopped should have been my tool here.

Don't get caught up in the emotions of picking up something, only to get wrapped up in a bad deal. Just be aware of things and don't pay the farm for something that you have been wanting for the last 10 years only to find out when you have time to evaluate it properly that it's better as a doorstop.

Swap meets are an excellent place to acquire items to stock a junk box. Just do it gently and use cost effectiveness in making purchases. After all, you are supposed to save money, not spend it like there is no tomorrow. 73

HAMSATS

Amateur Radio Via Satellites

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Two up, one on

Good news and bad news. UoSAT 12 and RS-19 were placed in orbit in April. The latest offering from the University of Surrey in England is doing well, but the Russian/French hamsat was never turned on. UoSAT 12 is now known as UoSAT-OSCAR-36. It is a rather large hamsat with many advanced digital experiments. RS-19 was built in France to be the third Sputniklike commemorative hamsat, hand-launched from the Russian *MIR* space station. The March Hamsats column provides a look at the designers and builders who made RS-17 and RS-18. They were also responsible for RS-19, but not the ensuing international problems. Somehow, a hamsat had been hijacked by the commercial world, modified as a flying advertisement, and sent to *MIR* for later launch.

RS-19/Beatnik/Swatchsat

We have cellular telephones for business and VHF/UHF handie-talkies for our amateur-radio hobby fun. We have geostationary TV satellites for commercial broadcasts and the OSCAR (Orbiting Satellite Carrying Amateur Radio) series of hamsats as an extension of ham "hobby" radio. Commercial and amateur radio are two separate entities that are not supposed to mix.

The Swatch Corporation [http://www.swatch.com], known for their innovative line of watches, seemed to think that they could buy advertising in space on ham frequencies. Virtually all amateur-radio satellites have some form of sponsorship or donations from government, educational, or commercial sources. Money from the pockets of hamsat enthusiasts is just not enough to design, build, and launch satellites, but Swatch went too far with Beatnik.

RS-19 was designed as an amateur-radio satellite to store voice messages for broadcast from orbit on two-meter FM. Per the terms of a contract between Swatch and the Satellite Control Center in Moscow, the Swatch Corporation of Switzerland defined the message content. The Swatch Beatnik messages were clearly commercial and designed to promote Swatch and its Internet Time via the "beat" theme.

When the amateur community heard about the transformation of RS-19 into the Swatch Corporation Beatnik, three distinct groups formed. The first group reacted to Beatnik as a near-criminal interloper in the ham realm. They sent E-mail everywhere they could, including to Swatch. The second group said little, but considered the possibility that hams could somehow make lemonade from the rather sour situation. Perhaps the messages could be reprogrammed in space, or the satellite could be returned to Earth and reconfigured.

The third group began studying international law regarding the commercial use of amateur-radio spectrum. Representatives of various national and international organizations, including AMSAT-NA, AMSAT-France, AMSAT-Russia, and the American Radio Relay League, sent information to Swatch and the Russian launch authorities explaining the legal problems surrounding Beatnik.

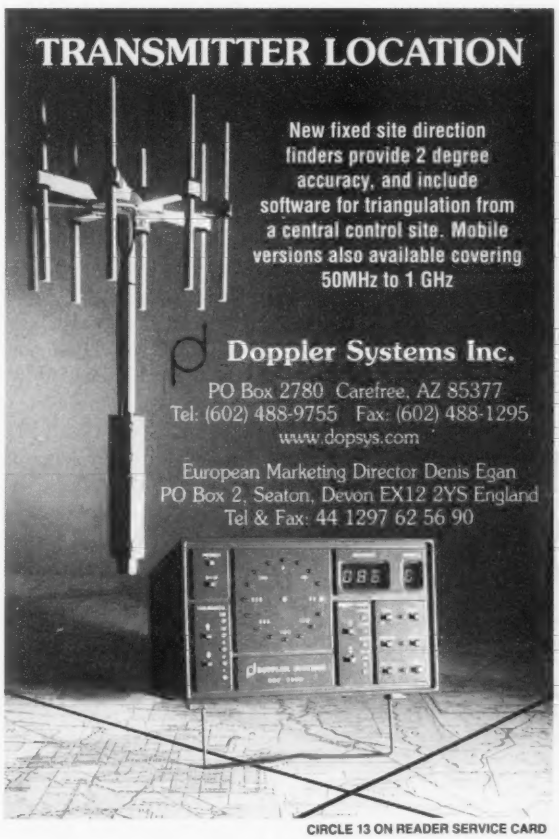
On April 16, 1999, RS-19/Beatnik/Swatchsat was hand launched by Jean-Pierre Haignere from *MIR*, but the satellite was not turned on. Later in the day, Jean-Pierre stated via radio from *MIR* that he had received instructions not to turn the satellite on because it was carrying advertisements that did not comply with amateur regulations.

Up until the last minute, AMSAT-France attempted to convince Swatch to cancel the commercial end of the project and work a compromise that would give the satellite back to the amateur community. Swatch declined, and decided to literally kill the satellite by launching it dead with power off. Swatch later said on their Web site and in a full-page statement in the *New York Times* that the batteries in Beatnik were being removed from the satellite and donated to the Russian Spaceflight Control Center for use in a printer on *MIR* that had quit due to battery failure.

Did the printer on *MIR* really go down? Could the batteries in Beatnik really be used to save the day? Just how commercial were the Swatch messages? Several years ago, it was decided not to put voice messages from school kids on Dove-OSCAR-17 due to possible conflicts with international law. While the Beatnik/Swatchsat messages look rather innocuous, they are obviously not amateur-radio-related. Here are a few of the messages that had been reportedly programmed into the non-volatile voice chip in Beatnik/Swatchsat:

Let peace beat you, not war defeat you, I just want to hear your hearts beat at their own pace on Earth in the universe.

Continued on page 46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HAMSATS

continued from page 45

Let love beat all the wars on our wonderful planet!

Nobody is going to beat me!

Gravity cannot be held responsible for people falling in love. Keep the beat alive.

Let our hearts beat together in a sound of friendship.

You must learn more about technology than it can learn about you. Don't let the system beat us. Advancement without losing privacy.

I will always remember every beat of my heart, 'cause all of them are like a sunset in the ocean or a rainbow in the mountains.

Who's who

In the June issue of *QST* from the ARRL, an item in the "Happenings" column on page 79 rather succinctly describes the events surrounding Swatch, Beatnik, and the amateur-radio community, but with some significant omissions. The text says nothing of the efforts of AMSAT-NA and AMSAT-France to curtail the Swatch activities.

The president of AMSAT-France, Dr. Bernard Pidoux F6BVP, provided some history and insight on the Swatch problem on April 13th. Bernard noted that the RS-19 work began in December 1998, with a contract between Mssrs. Oleg Volkov, Serge Samburov, and Vladimir Soloviev, representing SCSC (Spacecraft Control Center in Moscow), and AMSAT-France. The SCSC wanted a satellite similar to RS-18 to be completed and delivered by February 22, 1999. Items in the contract referring to Internet beat time and a project name of Beatnik were the first indications that something was not right. AMSAT-France signed the contract but made additions specifying that commercial activities were not allowed on amateur-radio frequencies. The SCSC did not honor the modified contract terms. They effectively sold RS-19 to Swatch for use as a marketing/sales tool on the two-meter ham band.

The president of AMSAT-R (Russia), Eugene Labutin RA3APR, made a statement nearly a month earlier in response to messages received from Bernard Pidoux F6BVP. Eugene pointed out that AMSAT-R, while mentioned in the RS-19/Swatchsat/Beatnik contracts, was not involved. None of those signing the contracts on the Russian side had any authority to sign documents of this type representing AMSAT-R. He further stated that only three members of AMSAT-R are authorized to do this: the president and the two vice presidents.

The president of AMSAT-NA, Keith Baker KB1SF, worked with sources within AMSAT to provide the ARRL, the IARU, and AMSAT international groups with information and suggestions. Keith knew who the key players were on both sides and the potential ramifications to the ongoing standoff between amateur radio and commercial interests that would like to have our VHF and UHF allocations.

RS-19/Beatnik/Swatchsat is a loss. Amateur radio supporters kept the commercials out of the ham bands, but the satellite was sent into orbit without power. Swatch went on to promote their "beat" and Internet time theme via their Web site. AMSAT-France will continue with their other hamsat projects. You can find out more about the programs of AMSAT-France on their Web page: [http://www.ccr.jussieu.fr/physio/amsat-france]. An excellent source of information about the Swatch protest and boycott can be found at Rob Carlson's (KC2AEI) site: [http://wmbc.umbc.edu/rob/swatch-protest].

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UoSAT-OSCAR-36

UoSAT 12, now known as U-O-36, was launched on April 21st on a converted SS18 ICBM (Intercontinental Ballistic Missile) from a silo at the Baikonur Cosmodrome. The outside temperature at the time of launch was just above freezing, but the UoSAT team from the University of Surrey in England got a clear view of a rather unusual liftoff. The missile carrying the newest hamsat was ejected from the silo by compressed gas. About 125 feet above the windswept Khazak desert plain, the first stage engine fired, propelling the rocket up through an almost cloudless sky. A short while later, the signal came through that UoSAT 12 was in orbit. The General Director of Kosmotras and head of the Russian Strategic Rocket Forces presented the team with a certificate of launch just before the champagne was opened.

The final orbit for U-O-36 is 650 km high, with an inclination to the equator of 65 degrees. A few hours after launch, commands were sent to the satellite from Surrey's control station in England. All systems checked out and the satellite's subsystems were enabled.

Within a week, the satellite had stopped tumbling and the 3-axis stabilization system was on line. On April 28th, a 10-meter resolution panchromatic image was taken over Texas and downloaded to Surrey for evaluation. The image showed good detail. Some adjustments were made, and a second image was taken over London, with excellent detail showing freeways and housing areas.

U-O-36 weighs nearly 700 pounds. It was built by Surrey Satellite Technologies, Ltd., to validate various small satellite bus structures and payloads. It carries equipment for multispectral and panchromatic Earth imaging, in addition to amateur digital communications systems on VHF, UHF, and microwave frequencies.

The primary digital downlink frequency is 437.400 MHz. U-O-36 operates in a similar fashion to the other high-speed digisats, with a 9600-baud output and input. However, in late May Peter Guelzow DB2OS reported excellent copy on the 38400-baud output frequency (437.025 MHz). This high-speed channel is usually activated simultaneously with the primary downlink, and is usually only on when the satellite is in view of Surrey. Over time, this may change, as the higher data rate gains more acceptance in the amateur satellite community.

U-O-36 can also operate at 76800 baud. Most current ham gear is set to work at a maximum rate of 9600 baud. Special receivers are needed that can handle the wider bandwidth of the higher data rates, or serious modifications are required on existing radios to achieve the same results. Peter reported that he was using a modified G3RUH modem set for 38400 baud and a Symek TRX4S high-speed data transceiver with a 110 kHz filter. This filter performs very well at 38400 baud, but can also perform up to 78600 baud.

In order to operate at faster rates such as 153600 baud, a wider filter (300 kHz) must be employed. Peter also made modifications to his TNC (Terminal Node Controller) to allow for transmission at 9600 baud with simultaneous receive at 38400 baud. Information about the TRX4S can be found on the Internet at: [http://symek.com/tnc-g/trx4s-ds.htm].

U-O-36 promises to be an exciting addition to the hamsat fleet. In addition to the imaging and message forwarding experiments, the satellite has devices for GPS (Global Positioning System) orbit and attitude determination, cold-gas orbit and attitude control, nitrous oxide resistojet orbit control, star imagers, reaction wheels, and even an Ethernet LAN (Local Area Network). More information about U-O-36 and SSTL can be found at: [http://www.sstl.co.uk]. 73

Number 47 on your Feedback card

HOMING IN

Radio Direction Finding

Joe Moell P.E. KØOV
P. O. Box 2508
Fullerton CA 92837
[Homingin@aol.com]
[http://www.homingin.com]

Four centuries of foxhunting

"The pursuit of the uneatable by the unspeakable!" That's how Oscar Wilde is said to have described foxhunting. Of course, he wasn't referring to the kind of foxhunting that hams do. But why was he so incensed?

Hunting animals for sport has gone on for centuries. In 17th-century England, stags, boars, and hares were the preferred quarry. But widespread tree-cutting for fuel and shipbuilding had destroyed woodlands and decimated the deer population. After the king decreed in 1670 that hunting of the "endangered" stag could be done only by his personal invitation, the Duke of Buckingham started the sport of foxhunting.

In those days, foxes were considered to be vermin in the Midlands area north of London. They sometimes attacked little lambs. So sportsmen decided to chase them. "Chase" is the operative word here, as the gentry horsemen in a field of foxhunters left the actual hunting to a pack of about four dozen dogs. English foxhounds were specially bred for speed and trained to hunt by a lower-class servant called the huntsman.

Traditionally, each year's foxhunting season began on the first Monday of November and continued through the end of the year. In the early morning of a hunt day, while these nocturnal animals were out foraging, servants stomped closed all the foxholes in the hunt area. Unable to find safety in their dens, the foxes sought cover in thickets.

A little before noon, after a gala lawn breakfast, all the gentry horsemen would gather at one end of a thicket. The huntsman sent his hounds into the other end to flush out the foxes. "Tally ho!" was the cry as the first hapless fox appeared, whereupon the hounds would track it down and eventually devour it for lunch.

What about the mounted sportsmen? In truth, all they did was chase after the hounds, galloping gleefully cross-country, trampling fields and splashing through rivers. If they could stop the ravenous hounds in time, each rider ended up with a fox head, paw, or tail for his mantel.

Foxhunting didn't really reduce the vermin population in England, because it became so popular that more foxes were imported just to have plenty of animals for the hunt. By the middle of the 18th century, it was the favorite activity of sportsmen. Gentry English emigrating to the New World sometimes sent their hounds ahead so that they could enjoy the sport here. George Washington was passionate about the sport, having been introduced to it when Lord Fairfax hired him as a teenager to survey portions of the

Continued on page 50

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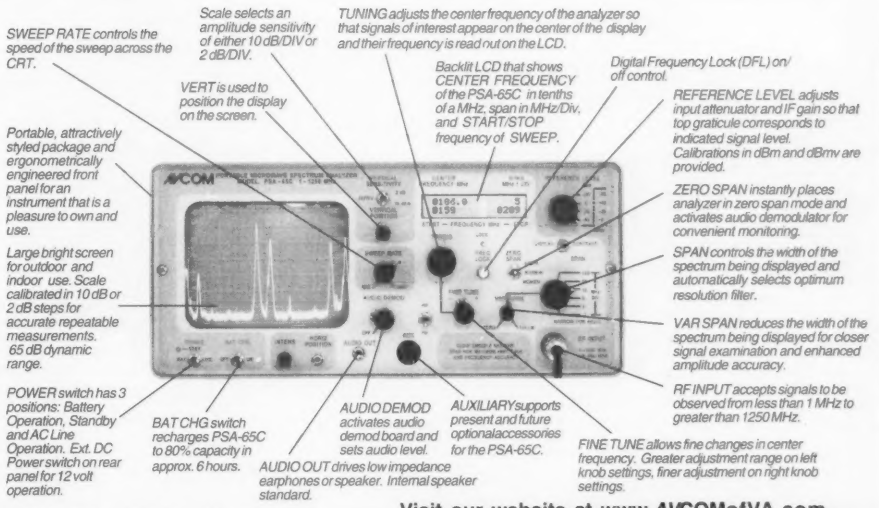
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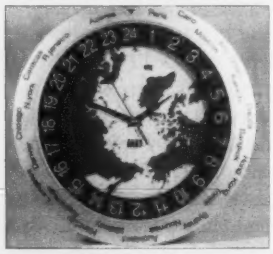

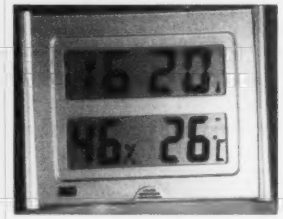

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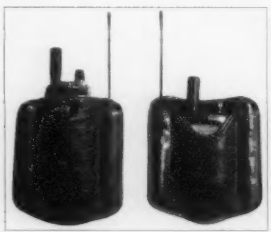

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Advertisers' Index

R.S.#		page
•	A & A Engineering	25
•	All Electronics Corp.	11
16	Astron Corporation	1
•	Avcom	47
42	Bilal Company	38
168	Buckmaster Publishing	21
56	Buckmaster Publishing	38
99	Communication Concepts	23
10	Communications Specialists, Inc.	13
•	Denver Amateur Radio	16
13	Doppler Systems	45
193	GGTE	49
•	Glen Martin Engineering	21
78	Hamsure	21
•	Hamtronics, Inc.	CV2
•	Heights Tower Systems	13
86	hy-gain	8
77	InterFlex Systems Design Corp	33
42	Isotron	38
242	Jan Crystals	19
158	Japan Radio Co.	CV3
•	Kachina	CV4
275	Lakeview Company, Inc.	23
•	Maggiore Electronic Lab	38
86	MFJ Enterprises	2
86	MFJ Enterprises	7
86	MFJ Enterprises	8
86	MFJ Enterprises	9
86	MFJ Enterprises	15
160	Micro Computer Concepts	21
•	Micro Control Specialties	25
136	Milestone Technologies	17
136	Morse Express	17
193	Morse Tutor Gold	49
248	Motron Electronics	38
64	Mouser Electronics	17
•	MultiFax	29
•	Nemal	49
•	Omega Sales	33
•	Omega Sales	53
•	Peet Bros.	30
•	Radio Book Shop	13
•	Radio Book Shop	21
•	Radio Book Shop	33
•	Radio Book Shop	46
•	Radio Book Shop	49
•	Radio Book Shop	56
•	Radio Book Shop	63
58	Radio Engineers	26
34	Ramsey Electronics	5
•	RF Parts	29
254	Ross Distributing	17
36	Scrambling News	33
167	Sescom, Inc.	38
141	The Nicad Lady	23
•	Thomas Miller	26
269	Tigertronics	43
•	Universal Radio	19
86	Vectronics	9
259	Versatel Communications	13

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continued from page 47

five million acres that Fairfax had inherited in northern Virginia.

Foxhunting is a relic of days when there was no compulsory education and a choking yellow smog blanketed London from coal stoves in homes. Things are better now, right?

Oops, wrong kind of fox!

Bushy-tailed animals have nothing to fear from ham operators on foxhunts, although the hams sometimes look just as silly as foxhounds when they scurry about trying to find hidden radio transmitters. Nevertheless, it's hard to imagine why ham operators gave the name of an inhumane pastime of the 18th and 19th century to an exciting and educational radio sport.

Instead of the sense of smell, today's ham radio foxhunters are using radio direction finding (RDF) equipment, of course. I think that the history of RDF is even more interesting than that of English foxhunting. In "Homing In" last September, I explained how Marconi, Bellini, Tosi, and others pioneered RDF about 80 years ago.

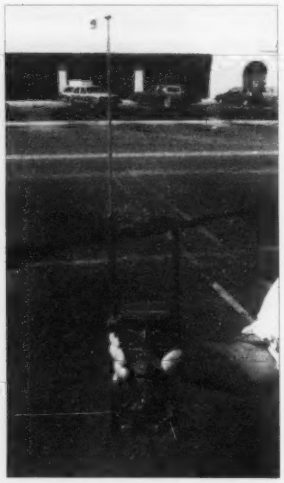

Photo A. *Classic military RDF antennas like this one from the Korean War era are plentiful and inexpensive at flea markets. They are a great way to get started in transmitter hunting on the 6-meter band.*

From plotting the movements of World War I ships to tracking down stolen BMWs, radio direction finding technology has come a long way in eight decades. A lot of interesting things have happened in between, as readers of the September column were quick to point out. Several hams at my local radio clubs passed along their remembrances of early RDF equipment and their experiences with it.

Mike Obermeier KD6SNE reminded me about "White Heat," a motion picture classic from 1949. A team of gangsters led by James Cagney is tracked by RDF after an officer infiltrates the gang and constructs an emergency beacon transmitter out of a radio receiver. FCC agents with rotating loop antennas on their sedans relay their bearings to headquarters, where they are triangulated on a giant map of the Los Angeles basin. Will they find the beaconing tanker truck in time to stop the payroll robbery? It's great fun to watch and to imagine what these postwar-era G-men would think about APRS.

Among the letter writers was Pete Hardiman N7DUC of Hillsboro, Oregon. His story was a reminder that RDF was saving lives long before ELTs on aircraft became common. "I enlisted in Canada in 1941," Pete writes. "I flew over a hundred missions over enemy territory in Canadian DeHavilland Mosquito aircraft before transferring to the US Army Air Force in late 1943. Then I flew fighters as a bomber escort until the end of the war. The bases in England often used the Marconi RDF system with goniometers to guide aircraft home in dark or bad weather.

"One night in 1943," N7DUC continues, "my navigator and I were in a Mosquito over central Germany heading 270 degrees (westbound) after a mission. We heard a distress call from a British Halifax bomber damaged by flak that had destroyed their liquid compass and radio compass control box. Their aircraft HF antennas were not working either, so the radio operator was using the trailing antenna, about 75 feet long, hanging below.

"We got them to call several times over a five minute period so we could take RDF bearings, and we determined that they were flying northbound somewhere behind us. We got them to turn left and verified that they were then traveling our way. We slowed our own progress to increase their signal strength and asked them to look below for points on the ground. Soon we had them located about 125 miles behind us. They continued to call and pinpoint the ground for navigation.

"When they reached the enemy coastline, we were taken over by ground radar, so they reached their home base that night safely. My navigator and I were invited to visit the Halifax crew and received a special citation for saving their lives. Not being able to determine which direction they were flying or their position, they were helpless. But we could not have done anything for them without RDF."

Caught by kilocycle kops

The decade of the 1950s was the golden era of FCC enforcement. In those days of ample budgets, government monitoring stations cruised the bands, nipping trouble in the bud. Nothing was more feared by a ham than a personal visit from these "Kilocycle Kops," as one writer of the day called them. Every FCC Field Office employee had interesting stories to tell. One of the best is the story about the bogus satellite, which was passed along to me by Larry Guy K6EZM, former Engineer-in-Charge of the LA FCC.

When *Sputnik I* was launched on October 4, 1957, FCC monitoring station engineers were instantly bombarded with requests for information about its radio transmissions. During its 21 days of transmitting, and the week of transmissions from *Sputnik II* in the following month, hundreds of man-hours were spent analyzing the first man-made signals from space. Officials from many government agencies wanted to know all they could about the bird before the frequency went silent.

Imagine everyone's surprise when *Sputnik*'s frequency came alive again in mid-December. The familiar beep-beep lasted only twenty seconds or so at a time but was there regularly, once every hour. Listeners in several countries heard the signal, but the Soviets firmly said they had not launched another satellite. What was going on?

FCC engineers soon determined that the signal was not from *Sputnik I* or *II* having come back to life. Whereas the satellites had been on both 20 and 40 MHz, this signal could only be detected at the lower frequency. Furthermore, all listeners worldwide heard it at the same time, not spaced out over an orbital period.

RDF installations at the monitoring stations triangulated the signal to the mountains north of Los Angeles. Now it was up to the field engineers to find its exact source. There was no time to lose, for continued presence of this mystery signal could have international implications.

Mobile units determined that the source was not close to any road. An on-foot setup for RDF at 20 MHz did not exist and had to be devised. It was quickly put together using a tube-type general coverage receiver, vibrator power supply, and a six-volt car battery, all mounted on a military-type stretcher for a two-man carry. Both a loop antenna (similar to **Photo A**) and a ferrite loaded dipole were used at various times to get lines of bearing.

Remember that the signal was on for only twenty seconds out of each hour. Combine that with the mountainous terrain and the problem of occasional erroneous bearings from skywave paths (this was the peak of the sunspot cycle), and you have a truly grueling

Number 51 on your Feedback card

On the Go

Mobile, Portable and Emergency Operation

Steve Nowak KE8YN/4
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Palm Bay FL 32907-1371
[ke8yn@juno.com]

Is the Y2K bug a significant problem, or is it just something everyone has blown out of proportion? I heard a great comment on the news the other day that put it into perspective. One individual, when asked about the Y2K problem, compared it to an earthquake. He proposed that we knew for certain that there would be an earthquake on a given day at a particular location. This earthquake could be anywhere from a 1 to a 10 on the Richter scale, so there might be no damage or perhaps massive destruction, but regardless of the severity we knew for certain that it would occur and when. Would we prepare for this? Of course. This, he said, is like the Y2K bug. There may be great or small problems on the first of January 2000, but knowing that it will occur means that it is in our best interest to prepare. I think this is a great philosophy.

Last month, I addressed some of the ideas for preparing for problems we might face next January. For the most part, I was thinking that we might face many of the same problems that we encounter during bad weather disasters: loss of power, loss of traffic signals, etc. I think there is one major difference that we might face when dealing with Y2K: Some people, in their zeal to prepare, might add to the very problem they are trying to avoid.

People may not be completely familiar with some of the equipment or supplies they are purchasing. Let's look at some of the possibilities.

Generators: How many generator owners know how their generators should be used? Aged gasoline that has sat in the tank for an extended period may make a generator difficult or impossible to start. Operating generators need to be located in a vented area—preferably out-of-doors—to allow the exhaust to escape. Failure to locate a generator properly could result in carbon monoxide poisoning.

Fueling a generator may also present problems. It would seem to be prudent to shut the generator down and allow it to cool prior to fueling. It is highly likely that not everyone will do so, especially if they are attempting to fuel the generator after dark, so the threat of fire may increase. Finally, somebody somewhere will decide to plug their generator into their house to allow the house lights to be used. It is unlikely that this individual will completely disconnect his house from the power grid. This will have a number of unexpected results, including a risk to the utility company workers. It will probably prove very interesting when the power comes back on.

Heaters: In the colder climes, people may lose heat. If electrical power is lost, not only will those with electric heat have problems, but also those who have fossil fuel furnaces that require a blower. Finally, I can't help wonder how many of the popular digital thermostats have embedded chips that might fail. People without heat will be forced to try alternative measures. Many homes have fireplaces, although they generally are used more because of their aesthetics than for practical heating. People using wood burning fireplaces regularly know that there is a bit of an art to starting a fire in order to ensure that the smoke draws up the chimney. Chimneys need to be kept clean and clear, but many people neglect to do so. A blocked chimney (or forgetting to open the flue) can result in a house filled with smoke. The tars that build up in a dirty chimney are flammable, and chimney fires can occur. Finally, some may try to use inappropriate fuel such as charcoal or kerosene (or worse), which may present an increased risk of fumes, carbon monoxide poisoning, or fire.

Telephones: Phones work differently (if they work at all) in a crisis. Even if all of the circuits are Y2K compliant, a significant increase in utilization will have an effect (ever have problems getting through to Mom on Mother's Day?). As everyone picks up their telephone to verify that friends and relatives are okay, the system becomes overloaded. Think about any circuit that normally has only a small number of devices drawing current. As you add more devices, naturally the current will drop, until the current falls below the level required to operate them properly. Of course, when the landline system fails, everyone immediately grabs their cellular telephone and guess what happens next?

Weapons: Yep, some people somewhere in the attempt to defend themselves from evils real (or imagined) will put a bullet through their foot, wall, neighbor, etc. Then there is the potential for some increase in crime. Some people have concerns about the banking industry's computers, automated teller machines, etc. After a satellite glitch shut down many credit card operations last year, this concern has some basis in fact. The government has announced that they

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hunt. One field engineer caught a severe fever that kept him off the job for several weeks. But the FCC didn't give up.

Shortly before Christmas, engineers Harry Barnard and George Dillon finally tracked down the pseudo-*Sputnik*. It was in an old hollow tree, its wire antenna threading up through the branches. The one-tube transmitter got power from a vibrator supply that was keyed by an automobile clock. Every hour, the minute hand brushed a stationary contact, started the supply, warmed up the tube, transmitted for a few seconds, and then shut down.

Finding this gizmo was only half the battle. Now the government higher-ups wanted to know where it came from. Was it a harmless prank or something more sinister? Taking no chances, FCC called in Marine demolition experts to make certain that the device was not booby-trapped. It wasn't, and soon the contents could be examined. Nothing about the transmitter, supply, or antenna was unusual or distinguishing, except the crystal.

A check with the crystal manufacturer showed that only two of its kind had ever been made, both on a special order for one of southern California's aerospace firms. The company's management was cooperative, and eventually two young engineers confessed. Their "harmless" prank cost each one a $1000 fine and a year's suspension of his ham radio license.

Imagine carting a setup like that on your next sniffer hunt! Hidden transmitter hunting today may be just as challenging and frustrating, but it isn't nearly as arduous. Today's on-foot RDF gear is small and light enough for a child (yours?) to carry. Radio foxhunting for sport is fun for the whole family, so give it a try. For more information on RDF and foxhunting, visit the Homing In site on the World Wide Web, [http://www.homingin.com]. 73

Number 52 on your Feedback card

THE DIGITAL PORT

Jack Heller KB7NO
P.O. Box 1792
Carson City NV 89703-1792
[jheller@sierra.net]

My non-ham wife detected excitement in my voice as I called her into the shack and showed her the new mode on the screen. For those of us who look at a screen with a new program in progress, the equipment takes on a personality of its own. Being the understanding ham's wife, Janet stretched for a bit of enthusiasm and said something like, "That's wonderful!" Then she retreated carefully back to her bailiwick.

If the truth should be known, these Windows programs all resemble each other because there are buttons to click in all about the same places and there is a body part of the screen. That body part may as well be a word processor for the uninitiated.

Except that this was different. ... I was looking at the first PSK31 signal I had copied after installing the program and getting organized. The really unique part of copying this particular signal was that the audible tone was nearly nonexistent and, of course, that being the case, the S-meter was not moving! And ... it was nearly perfect copy. That stuff that resembles the working part of a word processor was appearing, as if by magic, from nowhere!

A brand new mode has arrived This was PSK31 doing what it does best, getting through, intelligibly, with very low signal strength, and using an absolute minimum of spectrum. I mentioned this mode and the Web address for download last month. (See chart.)

I didn't get (make) time to give it a try until nearly a month later. When you get the program, you are well advised to print and read the documentation. Although the setup is simple and straightforward, you must follow the instructions.

Fortunately, my desktop has a 16-bit sound card, which is specified. They do not sound fussy about what brand of sound card and they allude to versions of the program that will work with "other DSP development kits." I apparently have the "accepted" sound card, because the program worked great once I got my act together.

These sound card programs are not new to this column but, by way of review, they are doing a super job in that you can run them without a terminal node controller (TNC) or even a simple serial modem. I have a serial modem I made a year or so ago that, with the proper software, will work SSTV and RTTY. And I have my old-faithful hardware-based AEA PK232-MBX that performs well with less intense software applications.

The first sound card program I used was from Silicon Pixels. They produce excellent software for SSTV that is available for download from their Web site. (See chart.) This software provided my first adventure with using the sound card to interface directly to the radio.

I mentioned last month that if you had done as I, and made up your cables to use your sound card for SSTV, you were ready to hook up for PSK31. I looked at my setup for the ChromaPix programs and decided I would make up a new, improved set of cables that would meet the specs for the new mode and be just a shade neater.

Besides, I wanted a portable set to hook up the laptop. Another part of the story will unfold in a few paragraphs concerning what happens when you stray from home base. The important part I want to get across is how they stress using what ICOM (my little 735) refers to as the accessory connector and not using the microphone connector or speaker jack to get sound to and from the sound card.

You are warned not to use the microphone input or the speaker output, to avoid overdriving and spoiling the effect of the mode. If you overdrive your radio, they claim the narrow bandwidth spreads right out and/or the signal becomes unintelligible. Also, you are told not to use your speech processor, as it will overdrive the signal.

Once I got the new cables in place and performed the initial setup of the program, I started listening. I couldn't hear signals. I tuned in the general area where you hear RTTY and PACTOR and heard plenty of those signals (14.072–14.088 MHz). I called CQ, with no response.

I tuned a little below 14.070 and heard the PACTOR bulletin boards. Then, for some reason I can't explain, I persisted in tuning that area while I kept an eye on the novel tuning indicator included with the program.

A novel tuning indicator it is. I would have made a screen shot of the program in action, but the tuning system would be so infinitesimally small it wouldn't make sense in print. It consists of a small circle with variable patterns that not only change shape and dimension but, when a decoded signal is in the process, it changes color!

That was when the excitement that I described at the beginning of the article struck me so vividly. The funny little shapes I was watching changed from red to a greenish yellow. Whoa, I thought, this is mentioned in the documentation. I covered the eye that was watching the yellow crawly pattern and focused the other on the body text and there, from out of

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are increasing the printing of currency because it is expected that so many people will want to have cash on hand.

Naturally, these emergencies will be in addition to those that occur every day and those caused by people celebrating a special New Year's Eve. So there may be some interesting challenges to be faced (or maybe not). However, it is better to prepare and not need to react than to not prepare. Incidentally, in early April there were a number of tests performed by power companies in preparation for January 1. No, they did not test the generators or the power grid. Instead, they tested their communications backup systems in case the regular communications systems, such as telephones, fail. They relied on their own radios, with overflow going to pay telephones and cellular phones. The news stories report that everything went well, but once again this may or may not be indicative of how it will go in January. The utility companies will be competing for the same phone lines or cellular frequencies as many others if there are problems.

As communicators we are often called upon to provide the links between different organizations in emergency situations. If Y2K does create power problems, much of what we may be called upon to do will be similar to what we have done in other disaster operations. The biggest difference is that this time we have plenty of warning. It would be wise to take advantage of the time we have to prepare intelligently.

Well, I'd like to add more, but I think I'm going to go check my battery supply—just in case. 73

nowhere, was someone's transmitted message forming before my unbelieving eyeball!

You will find, as I did, that you must tune slowly (make that s-l-o-w-l-y) in order not to miss the 31-Hz-width signal. That is less than 2% of the width of an SSB signal! Someone suggested using the RIT to fine adjust for receiving. I did that, but I would only advise doing so if you are either in contact with a station or are just reading someone's mail. The problem is that you will transmit far away from the frequency the other station will be monitoring if you should give him a call.

I found that it was hard to be noticed as I attempted to call CQ or answer other weak-signal calls. I recalled the advice about overdriving, and went back through the setup process to check that I was following the rules. All seemed to be okay.

Then I went back to the listen mode, and a louder signal was calling CQ—it moved the S-meter vigorously. I gave a call, and surprise! I made my first PSK31 contact. I would like to give Bill down in Alabama proper recognition, but I forgot his call and am away from home at this writing. We were both giving signal reports of S5 to S9 over a period in excess of a half-hour.

Bill has been doing digital modes for a long time. Sometimes, it is nearly unbelievable when someone tells me the last time we made contact was seven years ago and it was on AMTOR. There's a guy who efficiently and persistently keeps his digital logbook up to date.

We conversed, of course, primarily about the new mode. He brought a part of the tuning indicator to my attention that is especially relevant. I had noticed what I referred to as the waterfall. That is below the circle I mentioned.

The waterfall tells you if you are exactly tuned to the signal you are receiving. It is a spectrum analyzer. It also allows you to fine tune the signal with your mouse on the screen. Plus, it gives an idea of the width of the signal and lets you see if there are adjacent signals. The spectrum it samples is about 250 Hz wide, still pretty darn narrow.

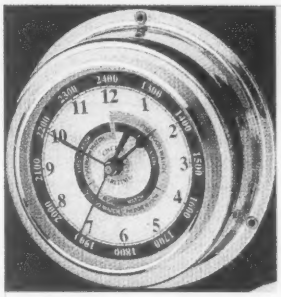
Bill tells me he has observed as many as four QSOs in progress within the breadth of the waterfall spectrum analyzer, and they were not conflicting with each other. Try that with any other mode. I have worked CW with good filtering amid a lot of signals, but once the filter was out of the picture, there was nothing intelligible. PSK31 is one giant leap forward, I must say.

As I mentioned, I am writing this while away from home. I was sure this would be a time when I could put this mode to the test with this laptop. (It always performs flawlessly.) Murphy's Law followed me again.

Before I left the house, I copied the program to disk. When I went to copy the files to the laptop from the disk, the disk corrupted. End of that portion of the experiment for a time. I shouldn't blame the computer. I think it had to do with the zipped file and I was trying to extract it from the floppy to the hard drive. Of course, you and I know that would not have happened at home where another copy could have been made.

Other software becoming available that will be a help to those who are in need of choices for their TNC will be reported on next month.

I received a message from Rick Ruhl, who heads a software group by the name of Creative Services Software. Rick explained they have software



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Current Web Addresses

Source for:	Web address (URL)
HF serial modem plans + software	http://www.accessone.com/~tmayhan/index.htm
SV2AGW free Win95 programs	http://www.forthnet.gr/sv2agw/
BayCom — German site	http://www.baycom.de/
Pasokon SSTV programs & hardware	http://www.ultranet.com/~sstv/lite.html
New Mode — PSK31 — Free download	http://aintel.bi.ehu.es/psk31.html
Baycom 1.5 and Manual.zip in English	http://www.cs.wvu.edu/~acm/gopher/Software/baycom/
Source for BayPac BP-2M	http://www.tigertronics.com/
TNC to radio wiring help	http://prairie.lakes.com/~medcalf/ztx/wire/
ChromaPIX & DSP software	http://www.siliconpixels.com/
Timewave DSP & AEA products	http://www.timewave.com
International Visual Communication Association — a non-profit organization dedicated to SSTV	http://www.mindspring.com/~sstv/
XPWare — TNC software with sample download	http://www.goodnet.com/~gjohnson/
Auto tuner and other kits	http://www.ldgelectronics.com
TAPR — lots of info	www.tapr.org
Creative Services Software	www.cssincorp.com

Table 1. *Handy URLs.*

Number 54 on your Feedback card

CALENDAR

Listings are free of charge as space permits. Please send us your Calendar item two months in advance of the issue you want it to appear in. For example, if you want it to appear in the November issue, we should receive it by August 31. Provide a clear, concise summary of the essential details about your Calendar item.

JULY 17

LOVELAND, CO Superfest99 will be hosted by the Northern Colorado ARC, 8 a.m.–2 p.m. at the Larimer County Fairgrounds, 700 Railroad Ave. Commercial exhibits, computer and radio goodies, and more. Reserve tables from *Michael Robinson N7MR, (970) 225-7501.* General info: *(970) 352-5304.* Talk-in on 145.115(-) 100 Hz.

WELLINGTON, OH The Northern Ohio ARS will sponsor NOARSFEST 99, Sat., July 17th, at Lorain County Fairgrounds in Wellington OH. There is a huge outdoor flea market area, ample indoor commercial space, reservations required. Indoor 8-ft. tables $15 each. All workers require an admission ticket. No tickets included with tables. $5 per 8-ft. space in flea market area. Admission tickets $5 at the gate. Children under 12 admitted free. Overnight parking for RVs and campers. No hookups. Walk-in VE exams with registration 8 a.m.–9 a.m. Exams start at 9 a.m. NODXA DXCC card checking (cards in by 11 a.m.). Contact *John Schaaf KC8AOX, (216) 696-5709, E-mail [kc8aox@qsl.net];* or write to *NOARSfest, P.O. Box 432, Elyria OH 44036-0432.*

JULY 18

CAMBRIDGE, MA A tailgate Electronics, Computer, and Amateur Radio Flea Market will be held Sun., July 18th, 9 a.m.–2 p.m. at Albany and Main Sts. in Cambridge. Admission $4. Free off-street parking. Fully handicapped accessible. Sellers $10 per space at the gate, $9 in advance—includes 1 admission. Setup is at 7 a.m. For space reservations or further info call (617) 253-3776. Mail advance reservations before July 5th to *W1GSL, P.O. Box 397082 MIT BR., Cambridge MA 02139-7082.* This event will be held rain or shine. Covered tailgate area available for all sellers. Talk-in on 146.52 and 449.725/444.725 PL 2A, W1XM rptr. Sponsored by the MIT Radio Society and the Harvard Wireless Club.

SUGAR GROVE, IL The Fox River Radio League will hold their Annual Hamfest at Waubonsee Community College, Rte. 47 at Harter Rd., Sugar Grove IL (5 miles NW of Aurora). Doors open Sun. at 8 a.m. with setup Sat. at 7 p.m., and Sun., 6 a.m.–8 a.m. VE exams at 10 a.m. Bring original license, copy of license, and photo ID. Talk-in on 147.210(+) PL 103.5/107.2. Contact *James Von Olnhausen N9UZC, c/o FRRL, P.O. Box 673, Batavia IL 60510. Tel. (630) 879-3042; or E-mail to [n9uzc@amsat.org].* The Web site is at *[http://www.frrl.org/hamfest.html].* The Fox River Radio League is celebrating 75 continuous years as an amateur radio club. There will be special anniversary promotions at the hamfest.

VAN WERT, OH The Van Wert Ohio ARC's 12th Annual Van Wert Hamfest will be held at Van Wert County Fairgrounds, US Rte. 127 South, 8 a.m.–3 p.m. Radios, computers, software, electronic parts, new and used. Indoor tables and outdoor trunk sales. Free parking. Overnight $10. Tickets $5. Talk-in on 146.85(-). For table reservations, send an SASE with your name and address to *Van*

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for the AEA/Timewave line and Kantronics. I mentioned that I had had a few calls for aftermarket software for the MFJ multimode units. His company will have them out before this hits print. He also mentioned software for PacComm equipment. They have a Web site with demos and further information, and I have downloaded the demo. The URL is included in this month's chart.

The behinder I get

Last month, I mentioned the availability of a DSP program from Silicon Pixels that runs on the sound card. I have it. I still have to give it a try and will tell you about it. It is another one of those exciting things that is happening in ham radio that keeps propelling the technology forward. And I expect it to work well because of good experiences with the DSP written into their SSTV program. This program, mind you, is not about SSTV, but other modes. I don't recall at the moment if it is for other than sideband, but I will find out and tell you.

What would the ham shack be like without a computer and sound card? And just think ... Some of these very fancy things being developed by hams will eventually find uses that will change the world for non-hams, probably my wife included (little smile there).

Short Y2K discussion

There is a lot of rhetoric about the demise of humanity come the end of 1999 because of the date problem in computers. I can't find anything really definitive about the truthfulness of all this and don't wish to get in the middle of heated exchanges on the subject. We do keep extra food and heating fuel and have a small generator because we live where winter can take its toll on transportation and power lines.

A few years back, a flood disrupted the natural gas service for a period of several days. It was good to have something to fall back on while we were being "taken care of" by the utility company that we take for granted.

All that aside, there is the problem with my aging desktop and this fairly young laptop. I see plenty of "fixes" available. Some free, some pricey. I am not sure what to recommend and should be careful, but I picked one from a fairly large company, Parsons Technology, that was reasonably priced. It came for a little over $20.

Installation of the small program was quick and simple. It claimed to have made a few fixes and would have to wait until the witching hour at the beginning of the year 2000 to see what else it could do, and explained that I should go on with life until that day.

There was no mention of need for a lead-lined suit when booting the computer on that fateful day. Interestingly, there is a DOS message that appears each day, on boot-up, that says there is no need to make any changes concerning Y2K at this time.

Not being a self-proclaimed expert on this subject, I cannot tell you positively that I have found the solution to my Y2K problems with this program. However, since the only date specific actions have to do with saving files and a few automatic date insertions, I will have to wait and see.

Worst case may be changing motherboards and software. Simplest repair may be simply to set the computer clock back a few years *[or to 1972, which mirrors the year 2000 — ed.]* until I can afford to really fix the problem. We shall see.

Please send questions or comments to [jheller@sierra.net]. I will share what I know or find a resource for you. For now, 73, Jack KB7NO. 73

Wert ARC, P.O. Box 602, Van Wert OH 45891-0602; Tel. (419) 238-1877; or E-mail Bob WD8LPY at [barnesrl@bright.net]; Web site is [http://www.bright.net/barnesrl/w8fy.html]. 8-ft. tables $10 each (includes one free ticket). Trunk sales: 12-ft. x 1-ft. area, $5 plus ticket. VE exams: Must pre-register by July 11th. Contact *Bob High KA8IAF, 12838 Tomlinson Rd., Rockford OH 45882. Tel. (419) 795-5763.*

JULY 23–24

OKLAHOMA CITY, OK The Central Oklahoma Radio Amateurs will sponsor their 26th annual "Ham Holiday '99" at the Oklahoma State Fair Park (Hobbies, Arts & Crafts Building), northeast of the I-40 & I-44 intersection. Doors open 5 p.m.–8 p.m. Fri., July 23rd, and 8 a.m.–5 p.m. Sat., July 24th. Technical and nontechnical programs. Fox hunt, WAS card check, VE exams, flea market. Pre-registration $7, $9 at the door. Flea market tables $10 in advance, $15 at the door, if available. Electrical hookup $5. Talk-in on 146.82. Additional info and registration forms are available on the CORA Web site at *[www.geocities.com/heartland/7332].* Address other inquiries to *Ham Holiday '99, P.O. Box 850551, Yukon OK 73085-0551; or E-mail [n1lpn@swbell.net].*

JULY 24

CINCINNATI, OH A hamfest will be held by the OH-KY-IN ARS at Diamond Oaks Career Development Campus, 6375 Harrison Ave., beginning at 7 a.m. July 24th. Take I-74 to the Rybolt and Harrison Ave. Exit. Go east on Harrison Ave. The hamfest is on the right-hand side (south side) of Harrison, less than one mile from the I-74 exit. Special seminars to develop technical understanding in amateur radio, and a transmitter hunt at noon, are among the events to be featured. The first two flea market spaces are free with admission, additional spaces @ $3 each. Admission $4 in advance, $5 at the door, 12 and under free. Indoor vendor tables with electricity, $8. VE exams. Talk-in on 146.67. Contact *Dana Laurie WA8M, 280 Hillcrest Dr., Cincinnati OH 45215-2610. Tel. (513) 761-7388; E-mail [wa8m@arrl.net].*

AUG 1

CROOKED LAKE, ANGOLA, IN The Annual Land of Lakes Hamfest will be held at Steuben County 4-H Fairgrounds, Corner of 200 W. and 200 N., exit 150 off of I-69. Doors open 7 a.m.–2 p.m. Free parking. VE exams. Tickets, $3 in advance, $4 at the gate. Vendors setup Sat., July 31st, 3 p.m.–10 p.m.; Sun., Aug. 1st, 4 a.m.–7 a.m. Indoor tables $8. Trunk sales $2. Talk-in on 147.180 PL 131.8. *E-mail [sharon.1.brown@gte.net],* or call *(219) 475-5897.* Sponsored by the Land of Lakes ARC.

AUG 7

ALFARATA, PA The JVARC Hamfest and Antique Radio Swap Meet will be sponsored by the Juniata Valley ARC (Lewistown PA) and the Decatur Township Fire Company, at the Decatur Township Fire Co. Grounds, 8 miles east of Lewistown PA, on US 522 North. The event starts at 8 a.m. Setup at 7 a.m. Admission $1 donation, XYL and kids free. Tailgating $5 donation. Talk-in on 146.910. For info call *Richard Yingling WB3COB at (717) 242-1882.*

AUG 8

GREENTOWN, IN The Kokomo and Grant County ARCs will host the Greentown Indiana Hamfest at the Greentown Lions Club Fairgrounds, beginning at 8 a.m. EST. Setup at 6 a.m. EST. Talk-in on 147.240(+). Contact *L. B. Nickerson KA6NQW, 517 North Hendricks Ave., Marion IN 46952. Tel. (765) 668-4814; E-mail [ka6nqwnick@netusa1.net];* or *Kevin Cornell K9LHB, 422 Goode Ave., Kokomo IN 46901, (765) 457-0454; E-mail [k9lhb@netdirect.net].* The URL is *[www.netusa1.net/~ka6nqwnick/hamfest.html].*

MARTINS FERRY, OH The Triple States ARC Hamfest/Swapfest will be held Sun., Aug. 8th, 8 a.m.–3 p.m. at Red Men's Picnic Grounds, Cty. Rd. 4, Martins Ferry OH. Large open free flea market space. Price of admission $2. Tables under cover with electric built-in. For info and directions, contact *TSRAC, 2011 State Hwy. 250, Adena OH 43901. Tel. (740) 546-3930; E-mail [k8an@aol.com].*

PEOTONE, IL The Hamfesters Radio Club of Evergreen Park IL will hold their 65th Annual Hamfest on Sun., Aug. 8th, at the Will County Fairgrounds (I-57 Exit 327 East) in Peotone. They are providing an air-conditioned, fully enclosed pavilion for this event. Free overnight parking. $20 per table. One ticket free per vendor. The flea market electricity fee is $10. All others, $4 in advance. $5 at the door. All tables reserved. All cash due at reservation. Your gate pass will be issued at arrival. Your ticket will be needed. Sat. unloading and setup 3 p.m.–11 p.m. only. Gate opens at 6 a.m. Sun. Main Exhibition Hall opens at 8 a.m. sharp. Send reservations and donations to *Tom Davis, 14914 Washtenaw, Harvey IL 60426. E-mail [tdavis@internetplus.net].*

AUG 15

CAMBRIDGE, MA The MIT Electronics Research Society, the MIT Radio Society and the Harvard Wireless Club will hold a Tailgate electronics, computer and amateur radio Flea Market Aug. 15th, 9 a.m.–2 p.m. at Albany and Main Sts. in Cambridge MA. Admission $4. Free off street parking. Fully handicapped accessible. Sellers $10 per space at the gate, $9 in advance—includes 1 admission; setup at 7 a.m. For space reservations or further info call *(617) 253-3776.* Mail advance reservations before Aug. 5th to *W1GSL, P.O. Box 397082 MIT BR., Cambridge MA 02139-7082.* A covered tailgate area is available for all sellers. Talk-in on 146.52 and 449.725/444.725 PL 2A, W1XM/R.

YORK, PA A Ham and Computer Swap Fest and Fun Auction will be held at York Vo Tech School, located at the intersection of I-83 and PA 74. For additional info, call *(717) 741-1780 or E-mail [ad3e@arrl.net].*

AUG 21

ITHACA, NY The Tompkins County ARC announces its 1st annual Finger Lakes HAM-IN (hamfest and fly-in) at Tompkins County Airport (KITH), 3 miles NE of Ithaca. Large hangar for indoor vendors and displays. Paved outdoor flea market and parking. Airplane rides and aviation displays. Breakfast and lunch served. Admission $5, under 18 free. Indoor tables $10; outdoor spaces $2 each. VE exams, pre-registration preferred. Talk-in on 146.97. Contact *Richard Spingarn, (607) 387-5251.*

LONGVIEW, WA The Lower Columbia ARA, W7DG, will sponsor its 8th Annual Ham Radio, Computer and Electronic Equip. Swap Meet 9 a.m.–1 p.m. at the Cowlitz Co. Expo Center in Longview. Admission $3. Tables $15. Tailgate spaces $5. Free parking, overnight RV parking on the fairgrounds for $12. Electrical hookup available. No VE exams. Vendor setup on Fri., 5 p.m.–9 p.m.; Sat., 6 a.m.–8:45 a.m. Talk-in on 147.26(+), PL 114.8. Take Exit 36 or 39 off Interstate 5 and follow the signs west for the Expo Center (or fairgrounds). Mt. St. Helens and the Oregon coast are nearby. For more info write to *LCARA Swap Meet, P.O. Box 906, Longview WA 98632;* or call *Bob KB7ADO at (360) 425-6076, in the evening. E-mail [kb7ado@aol.com].* Link to flyer online at *[www.qsl.net/nc7p/].*

AUG 22

ST. CHARLES, MO "Hamfest 1999" will be held by the St. Charles ARC, 6:30 a.m.–1 p.m. at Blanchette Park in St. Charles MO. Free admission. Ample free parking. Talk-in on 146.67. A parking lot flea market will be held for amateur radio and electronic items only. $10 per parking space. For vendors inside the air-conditioned Memorial Hall, tables are $15 each. Call for availability. Contact *Ken Fieser, (314) 428-4383; E-mail [kfieser@aol.com].*

AUG 28

GARDNER, MA The Mohawk ARC, Inc., will hold their 7th Annual Ham Radio, Electronics, Computer Hamfest at the Mohawk Drive-in Theater in Gardner, rain or shine. Spaces will be reserved for those who register in advance. Sellers' hours, 6 a.m.–3 p.m., $5 per space. Mail advance registration orders to *John Dould AE1B, 22 South Athol Rd., Athol MA 01331-2722.* General admission is 8 a.m.–3 p.m., $2 per person. Directions: Rte. 2 to Gardner, take

Exit 22, then Rte. 68 South to the first set of lights. Take a right at the lights onto Rte. 2A. Follow the airport signs for 1-1/2 miles. Entrance is on the left. Talk-in on 145.370 rptr.

LA PORTE, IN The La Porte ARC will host a hamfest Aug. 28th, 7 a.m.–2 p.m., at the La Porte County Fairgrounds IN, 2 miles west of La Porte. Admission $5 in advance, with this ad, or $6 at the gate. Tables $10 each. Outdoor tailgating is free. Talk-in on 146.52. Contact *Neil Straub WZ9N, P.O. Box 30, La Porte IN 46352. Tel. (219) 324-7525. E-mail [nstraub@netnitco.net].* See their site on the Web at *[www. geocities.com/siliconvalley/byte/1653].*

AUG 28–29

WOODLAND PARK, CO The Mountain ARC will hold a Camp/Swapfest Sat., Aug. 28th, and Sun., Aug. 29th, at the Colorado Lions Club Camp, 4 miles north of Woodland Park CO, on Hwy. 67 North. Free admission for buyers. $10 daily to camp and/or sell. Set up camp Fri., Aug. 27th, after 2 p.m. Talk-in on 146.820 rptr. Advanced reservations requested. Contact *Wes KØHPZ at (719) 687-8758; E-mail [wlw@prodigy.net];* or mail reservations to *MARC, P.O. Box 1012, Woodland Park CO 80866.*

SPECIAL EVENTS, ETC.

JULY 18

STRATFORD, NY The Fulton County Dr. Mahlon Loomis Committee will operate W2ZZJ on July 18th to commemorate the 173rd anniversary of the birth of Dr. Loomis, the American radio pioneer who was born at Oppenheim NY on July 21st, 1826. Operation will be from 1300–2000 UTC on the General class phone portion of 75, 40, and 20 meters, and on the Novice 10 meter phone band. Also on area 2-meter FM repeaters. For a parchment certificate and extensive literature, send QSL, contact number, and a #10 SASE (55 cents) to *George P. Sadlon W2ZZJ, 5738 St. Hwy. 29A, Stratford NY 13470 USA.*

JULY 30–AUG 1

OSHKOSH, WI The Fox Cities ARC (Appleton WI) will operate W9ZL from the world's biggest fly-in, "EAA Airventure '99," at Wittman Regional Airport in Oshkosh WI. SSB and RTTY operation will be Fri., July 30th–Sun., Aug. 1st, in the General portions of the phone bands. Operators of the club will man the station from 9 a.m.–4 p.m. daily. A special 8" x 10" certificate is offered for contacts with proper QSLs. QSL to *Wayne Pennings WD9FLJ, 913 N. Mason, Appleton WI 54914 USA.*

JULY 31–AUG 1

OGDENSBURG, NY Ogdensburg ARC, K2RUK, will operate 1800Z July 31st–0200Z Aug. 1st, commemorating the 250th anniver- sary of the founding of the settle- ment of Ogdensburg. Operation will be on 7.272 and 14.272. For a certificate, send an SASE to *Walt Brady N2YMY, 17 Birch Hgts., Edwards NY 13635 USA.*

USI W/VE Islands Contest, sponsored by the US Islands Awards Program, from 1600Z July 31st until 2359Z August 1st, on HF bands, all modes. Categories: W or VE island station, non-island station, or island rover, plus DX non-island station. Non-island stations send signal report and state, province/territory, or country. Island stations send signal report, island name, and USI or CISA number. Scoring: 5 points for each W/VE island plus island operators score 1 point for each non-island station. Multipliers: each different state, province/territory, and for island operators each different DX. Work stations once per island. Awards. Send logs by Sept. 10th to USI contest manager *Ray Phelps AD4LX, 1440 SW 53rd Terrace, Cape Coral FL 33914 USA. E-mail [ad4lx@usa.net]; Web site [http://www.eng.mu.edu/~usi/].*

AUG 21–23

40th Annual New Jersey QSO Party, sponsored by the Englewood ARA, Inc. All amateurs the world over are invited to take part. (1) The contest is from 2000 UTC Saturday, August 21st to 0700 UTC Sunday, August 22nd, and from 1300 UTC Sunday August 22nd to 0200 UTC Monday, August 23rd. (2) Phone and CW are considered the same contest. A station may be contacted once on each band—phone and CW are considered separate bands. CW contacts may not be made in phone band segments. New Jersey stations may work other New Jersey stations. (3) General call is "CQ New Jersey" or "CQ NJ." New Jersey stations are requested to identify themselves by signing "DE NJ" on CW and "New Jersey calling" on phone. Suggested frequencies are 1810, 3535, 3950, 7035, 7135, 7235, 14035, 14285, 21100, 21355, 28100, 28400, 50–50.5, and 144–146. Suggest phone activity on the even hours; 15/10 meters on the odd hours (1500–2100 UTC); 160 meters at 0500 UTC. (4) Exchange consists of QSO number and QTH (state/province or country). New Jersey stations will send county for their QTH. (5) Scoring: Out-of-state stations multiply number of complete contacts with New Jersey stations times 3 points per QSO times the number of New Jersey counties worked (maximum of 21). New Jersey stations multiply number of complete contacts times 3 points per QSO times the multiplier. The multiplier is the sum of the number of states (other than NJ), Canadian provinces, and NJ counties worked—maximum is 49 + 13 + 21 = 83. (6) Certificates will be awarded to the first place station in each New Jersey county, state, province, and country. In addition, a second place certificate will be awarded when four or more logs are received. Novice, Technician, and mobile operator certificates may also be given. A total of four plaques have been donated by the ARRL Section Managers for NNJ and SNJ to the highest scoring single operator station residing in each of their sections (separate plaques may be awarded for Novice/Technician and all other classes). (7) Logs must also show the UTC date and time, QSO exchange, band, and emission, and be received not later than September 18th, 1999. The first contact for each claimed multiplier must be indicated and numbered and a checklist of contacts and multipliers should be included. Multi-operator stations should be noted and calls of participating operators listed. Logs and comments should be sent to *Englewood Amateur Radio Assn., Inc., P.O. Box 528, Englewood NJ 07631-0528 USA.* A #10-size SASE should be included for results. (8) Stations planning active participation in New Jersey are requested to advise EARA by August 1st of your intentions so that they may plan for full coverage from all counties. Portable and mobile operation is encouraged. 73

Number 56 on your Feedback card

UPDATE

Alert readers have quickly pointed out an identical error in both Fig. 1 and Fig. 2 of "Regens for the Millennium, Part 1" in our June 1999 issue: The 470k resistor is shown on the incorrect side of the 100–1000 pF cap.

Also, in Fig. 4 all caps should be 10–40 *micro*farads (µF).

We apologize for any inconvenience these oversights may have caused. — Ed. 73

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QRX

continued from page 42

in unsurpassed vigor and cooperation, whatever the resident "contest man" suggests.

• Whenever OM bears relentless fright of tower height, others must climb said structure, unquestioningly, upon request.

• Coax cables may be routed to achieve the lowest loss, regardless of whether they cause doors, windows, etc., to be blocked or otherwise not to function. And if the house appears to be trapped in a sort of rubber "spider's web," that's a plus, rather than a minus.

Tnx and a don't forget all meals served in the shack to Hubert Daniel VE9DAN, Oyster River NB, via *X-Mitter,* newsletter of the Penn Wireless Assn., Howard Rubin N3FEL, editor.

A Mode Called CW

Considering upgrading? Heard the talk about CW being outmoded, and wondering whether it's worth expending the effort to become a Morse operator? Well, it is. Here are some facts to consider.

• CW requires less sophisticated, less expensive equipment than other modes. One result is that many third-world countries support CW as an inexpensive means for electronics students to gain on-the-air experience.

• CW can get through under difficult HF band conditions, when most other modes can't.

• Anyone who only has funds or antenna space for a "little pistol" station can take heart. With limited power and a small antenna, you can still produce a copyable CW signal—even in faraway countries.

• Many DX stations run only CW. If you wish to work those stations, you must speak their language.

• CW overcomes the language barrier. It is accent-free. (Well, almost: A few operators, using manual keys or "sidewinders," have distinctive "fists.") But with a few "Q signals," and standard phrases in English, you can have a conversation with someone who doesn't speak your language.

• CW is fun! It's a pleasure to get on the Novice CW bands, and see how far you can reach and whom you can contact. There is a great feeling of camaraderie in knowing that nearly everyone on the band is a beginner like yourself, that they are going through the same learning process you are. The routine CW contact—exchanging RST, QTH, name, then rig, weather, and maybe occupation—frees the newcomer from worrying about what to say. It promotes the sheer enjoyment of radio communications.

• For youngsters, CW removes the intimidation of talking to strange adults. The only way you learn the age of the other operator is if he or she tells you.

• CW is spectrum efficient. A CW signal is less than 500 Hz wide. So five CW stations can fit in the 0.5 kHz occupied by one station running SSB, RTTY, packet, or AMTOR. Those denigrating the value of CW seem to "forget" this essential fact.

• Lastly, because so many hams love CW, it's in no danger of dying out. So don't let the doomsayers worry you. Instead, jump in and give it a try. You might find yourself with a whole new sub-hobby to enjoy!

Tnx *à la mode* to the unknown author, via the February 1998 Frontier ARS newsletter, Jim Frye NW7O, editor; via the Sierra Intermountain Emergency RA *Sierra News,* N7MXA, editor (considerably edited down by AF6S); via the OH-KY-IN ARS in their April 1998 *The Q-Fiver,* Susie Scott N8CGM, editor.

NEVER SAY DIE

continued from page 4

neutrinos and, of course, a whole family of anti-particles.

Yes, I go pretty far afield in my editorials, trying futilely to get you to be healthier, wealthier, and wiser, but you're going to have to let me know if you really want to learn more about the particle zoo our physicists have exhumed with their pesky colliders. So, do you want me to publish Bob's paper? Why?

Frankly, I doubt that I'll ever hear a lepton conversation on a 75-meter roundtable.

Wheels

Never, in all my years in school, nor, for that matter, in talking with my parents — or even friends — did the subject of goals come up. Like most people, I suspect, I just floated along, making ad hoc decisions on the directions my life would take, but with no guidance (other than inertial) from me (or anyone else) that I can recall.

The first time the question of goals came up was when I was graduating from high school and guidance counselors were brought in to test us and help guide us.

I hadn't given the whole matter much thought, but it seemed like a good idea to go to Dartmouth and maybe be a lawyer. Well, that was 60 years ago, before lawyers had so thoroughly blackened the profession. My folks had a couple of good friends who were lawyers, but neither of them ever talked about it, so they weren't any influence. My father was in aviation, but he had so estranged me as a child that I didn't want to have anything to do with anything he was involved with, including smoking, drinking or fishing.

The guidance counselor looked at my test scores and said that I had an incredibly high mechanical aptitude, and in view of my interest in amateur radio, I really ought to go to an engineering college and take EE. Well, what the hell, so I did, ending up at Rensselaer Polytechnic Institute in Troy, New York. But I still hadn't a clue as far as any goals in my life were concerned.

The school system is pretty well standardized from kindergarten through high school — the years in which we are forced by law to go to school. Or else! But somewhere in high school kids ought to be encouraged to start thinking about what they might want to do with their lives so they could better educate themselves for it. Maybe they do that now, but I'll bet they don't.

The high school graduate has two main forks in the road to choose. One is to be educated so as to be a cog in a big wheel — to always be working for someone else. The other main route is to be a wheel. That, too, requires an education beyond high school, but it's one that, as far as I know, is not yet available from any colleges or universities I've visited or even heard about.

MIT has taken steps to encourage entrepreneurialism. I suspect they are leading the way. Good for them, if they're still doing it. I tried to get Rensselaer to help pioneer this route, but despite the endorsement of the RPI Council, the faculty torpedoed the idea and the president wasn't strong enough to override them. He quit.

Perhaps it takes a special temperament to be an entrepreneur. My grandfather, who was an inventor, was an entrepreneur, and he had a big influence on my life.

I'd like to see more emphasis put on starting and running one's own business. I am not a fan of big business. I still have a copy of a book written by a G.E. vice president who quit and wrote *Giant Business, Threat To Democracy.* And that was back around 1940. He sure has been proven right!

The real strength of America is in its small businesses, not in the *Fortune* 500 or our lawyers, doctors, and CPAs.

Nostradamus

Ed Dames' group of remote viewers checked out Nostradamus' quatrain 72 and told the Art Bell listeners that the prediction is that a terrorist biological attack will be made on the baseball fans at Shea Stadium in July 1999. How about that for being specific! Well, we'll see how it comes out. If they distribute something catching, the thousands of baseball fans could spread the contagion through the whole city in short order.

The Clinton gang has added considerably to the hate-Americans mentality in the whole Muslim world with their wag-

Continued on page 58

NEVER SAY DIE

continued from page 57

ging the dog attacks on Iraq, Sudan, and Afghanistan.

How well can our intelligence groups, with their miserly budget of only $40 billion a year, protect us? Have you bothered to pop down to your neighborhood Barnes and Noble yet for an $8 copy of their hardbound book by Mike Lanning, *Senseless Secrets*, a chronicle of the endless failures of military intelligence?

Or is Ed Dames full of … er … baloney?

Literacy

Time had a short item reporting on a study that showed that almost half of Americans over the age of 65 are functionally illiterate. Why am I not surprised?

The NH Economy

A survey showed that 70% of NH high-tech businesses are looking for more workers. We're so short of high-tech people up here that half of the companies are actively recruiting and hiring foreign workers. And I don't mean from Michigan, either.

New Hampshire has the most concentrated technology work force of any state — 79 high-tech workers per 1,000 people. And we have over 1,000 software companies, plus a NH Software Association! More than half of New Hampshire's exports are technology-related. New Hampshire's lifestyle, tax structure, and work ethic are attracting high-tech businesses. We have the highest growth of new, good-paying, high-tech jobs in New England. We are a "high-tech state."

New Hampshire is always on the top of any survey of the best places in America to live and for companies to locate. The lack of any personal income tax or sales tax is a plus, though we do have one of the highest property taxes in the country. But that's okay as long as you don't have an ego which demands a lot of land and a big home. If I had my druthers I'd live in a tarpaper shack on maybe two acres on a hill, away from any neighbors, and build most of my home underground where the tax assessor couldn't see it. Well, I don't need windows to store my books or CDs, for my office, or even for a ham shack. It would be cheap to heat and cool, and would still be around if any of the threatened disasters wipes out most of mankind. And the aboveground tarpaper shack.

Rationalization

Politicians have to be able to rationalize almost anything if they are going to accept bribes (a.k.a. campaign donations) or go along with a party line. But I watched with open wonder as almost all of the Democrats managed to swallow what little, if any, pride they have left by ignoring the repeated presidential perjuries and the orchestrated campaign of obstruction of justice. They have all condoned perjury and obstruction rather than punished it. They're saying that any future president can violate the laws of the land with no serious consequences.

Lenin, Hitler, and Mao were all popular with their people, and the power that that gave them was paid for with tens of millions of lost lives.

Over 40

90% of the business startups last year were launched by people over 40 who were tired of being downsized, laid off, or outsourced. They were fed up with working for someone else. The year before, only 73% chose a startup over seeking new employment. The word is getting out.

I've been hoping to get through to people 20 years or so earlier in their careers and help them avoid ever being laid off or downsized. But our whole society is so totally brainwashed over the importance of a college degree that eyes are blind and ears deaf to any other ideas. Worse, those too poor to go to college feel they have to settle for working for someone for a low wage. Maybe we need to have some of those microlenders in the US that in India and other poor countries are helping poor people start their own small businesses.

The business world has changed in the last 20 years. There are no more $12-an-hour union jobs, and both couples have to work to make the same effective pay as one used to make. 25% have to work two jobs, according to one report! In New England, 15% of the workers are self-employed, up from under 10% 20 years ago.

The Bioelectrifier

More and more letters have been arriving from happy bioelectrifier users. No complaints yet! Letters tell of not getting colds or the flu, even though they're going all around them — a weight gain for people who have been too thin, and weight loss for the fatties (which these days seems like almost everyone). Lots of "I've never felt better!" letters. Well, if you get rid of parasites or yeast infections which may have been around for a long time, that'll improve your body's ability to deal with germs and viruses.

Sunscreen Warning

If you get waterproof sunscreen into your eyes, you're going to have to be driven to the nearest hospital ER so they can flush it out with a special medication. Water can make it worse! It turns out that young children, in particular, get the sunscreen into their eyes and completely lose their sight. It's tough enough in this world when you have everything going for you. And how would you feel if you knew that your ignorance blinded your child. Or you, for that matter.

That reminds me of my editorial report that mice, fed the normal American diet, got skin cancer when exposed to sunlight. Those fed raw food did not.

The New Machine!

When Les Earnshaw demonstrated the new Kachina at Dayton, you can bet that the competition was all eyes, ears, and cameras. Well, this is the first really new development in ham gear in about 30 years — since the advent of sideband, solid state, and synthesized tuning. How long will it take before we see Japanese copies?

What I'd like to get is some letters from Kachina users — from the kind of hams who are the first to try new technologies, while everyone else waits. How totally has our public school system killed the pioneering spirit that got our country started just over a couple hundred years ago?

How about it, guys? Are you having a ball with your Kachina? Tell us about it! Let's see some letters.

For that matter, I'd love to see letters from any of you who are trying new stuff. Are you having a ball with slow scan, packet, RTTY, or what? Help me to get others out of their rut and enjoying the excitement amateur radio has to offer.

HDTV

For the last few years we've been threatened with high definition television. Yawn. I love the HDTV prices and the usual argument over standards. I like Tom Sowell's remark, "Is it really worth it to pay more money to see the same junk in sharper detail?" Heck, being a maverick and refusing to be dictated to by the networks as to when I'm going to watch their garbage, I tape anything I might want to look at and view it at my convenience, not theirs. And, I do all my taping at SLP because I don't really care for the improvement in picture quality I'd get at SP.

I do enjoy getting the latest gadgets, but they have to be cost effective, and seeing Springer, Roseanne, Oprah, and Geraldo clearer is not attractive. Not even the best of TV (like *Law & Order*) are worth it. Shove it, guys.

Sweet Deal

Maybe you missed the little item in a news magazine

showing that members of the House Banking Committee got an average of $33,000 from commercial bank PACs vs. $500 average for House members not on the committee. The Banking Committee members got an average of $20,000 more from securities firms and insurance company PACs. One thing we know for sure — none of the legislation these PACs bought is going to benefit us. We're just the dumb suckers who keep giving these crooks their ticket to ride the gravy train with bigger and bigger deductions from our paychecks before we even see them. ...

Hospital Job Security

I've been fussing with you about the need for you and your family to drink pure water. And that's water without added chlorine and fluorides. But what about when your kids are at school or you're in the hospital? Bad news.

A letter from a reader points out that almost all hospitals have water softening systems, as do most schools. These result in the copper pipes being rapidly eaten away. High levels of copper cause psychotic behavior. Just what a hospital's mental patients need! Just what the hospital needs to ensure their being long-term residents. Might this be contributing to the psychological problems children are having in schools? Of course it is.

Be sure you have pure drinking water at home, and arm your kids with bottles of water when they head off to school. Assuming you are still making sure your kids will be robbed of creativity, motivation, and brain development by sending them to public school in the first place.

Those Darned ETs

If you've been listening to the Art Bell W6OBB show you've heard a seemingly endless stream of experts testifying that the government knows about UFOs and ETs, but isn't telling us about it. The word must be leaking out to the general public, because a recent national poll showed that 80% of the people believe that the government would *not* tell us about ETs if they knew about them.

They know. But think what the reaction would be if the president went on TV and said well, yes, we're being visited by aliens, but their technology is so far ahead of ours that there isn't anything whatever that we can do about it. Further, we don't know for sure why they're here. We don't know how long they've been visiting. We don't know where they come from, or possibly when. We don't even know how many different kinds of aliens there are.

Oh yes, by the way, we've spent over a trillion dollars of your money trying to keep track of the aliens and to cover up what we've discovered so you wouldn't have to worry about them.

Power Leak

A reader sent me a newsletter from the American Public Power Association with the headlines that a Canadian study found no clear link between EMF and leukemia. Why does that remind me of the tobacco company executives all swearing before a congressional committee that there was no proof that their product was a health hazard or addictive?

Scientific Progress

Science *has* progressed, despite the best efforts of the scientific establishment to prevent it. At least two Nobel laureates have admitted that they lied about their proposed research work on their grant applications because they knew the peer review process would never allow them to pursue their real goals.

This peer review process has prevented most truly innovative papers from being published in the scientific journals. An article in the *JAMA* pointed out that "...some of the most distinguished of scientists may display sophisticated behavior that can only be described as pathological."

History supports the blindness of scientists when faced with something new, from Copernicus to Galileo, Darwin, Mendel, Ohm, Young, Harvey, Flemming, Wegener, Semmelweis, Pasteur, Lister, and so on.

The tomato was shunned in America for over 200 years after it was accepted in Europe because "everyone knew" it was poisonous.

The scientific establishment was horror-struck when Pons and Fleischmann, two respected electro-chemists, held a press conference to announce cold fusion instead of submitting their paper to a peer-reviewed journal. Not being total dummies, P&F knew they'd just be wasting precious months going the peer review route, there being no peers in this solid-state microfusion new field, and the reaction they'd discovered was well known to be totally impossible.

When one of the pioneers in this new field, distinguished professor Ed Storms, opined that the transmutation of elements was involved in the generation of excess heat, his colleagues at Texas A&M ganged up and tried to have him fired for suggesting such heresy. Witch burning is apparently still popular in Texas.

Plant Growth

With the development of a rotary transducer in 1966, it became possible to measure plant growth to an accuracy of ±0.001 inches. This made it possible to much more accurately measure the effect of thought on plant growth. The experiment was set up growing some rye seeds. The strip recorder showed that they were growing at a steady 0.00625 inches an hour. Olga Worrall, a well-known psychic who was 600 miles away, was called and asked to speed up the growth at a specific time. The strip was steady until that time, when it suddenly went to 0.0525 inches an hour! The growth gradually slowed down over the next 48 hours, but it never went back to its original rate. Olga's thoughts accelerated the rye growth by eight times, just by concentrating her thoughts on it remotely.

If thoughts can affect plants that powerfully, I wonder what they can do for or to humans? Maybe there's more to voodoo and witch doctors than just imagination.

But you don't have to be a psychic to demonstrate the power of thought to influence plant growth. You can do it in your kitchen with some seeds planted in plastic cups of dirt. Your positive thoughts will accelerate the growth and your negative thoughts will slow it down.

Enough Hours

This is about me. Well, hell, I keep asking the people who hear me on the Art Bell show to tell me something about themselves, so I'll share a little of my life with you.

My main problem is that there is so much to do and so few hours. There are so many books on my shelves that I haven't read yet, each one a treasure of information and ideas. Each one an adventure of the mind. Then there are the Dilbert books which have me roaring with laughter.

I've got thousands of CDs that I want to listen to over and over again. The thrill of the Gottschalk Tarantella, the incredible beauty of Delius' music. Nirvana. The Offenbach cello concerto, which I've only played a thousand times so far. Talk about industrial strength stress reduction!

Oh, how I wish you could share with me the books, the music, and my walks in our north pasture, where every few days bring out a new array of wildflowers. The excitement of seeing the wildlife—a dozen deer in our front yard, a dozen or so wild turkeys going methodically across the pasture I can see over my Macintosh as I write, the wolf I spied out my bedroom window the other morning. Pheasants, raccoons, bears,

Continued on page 60

elk, coyotes, buzzards, we've got 'em all.

There's the fun of writing. I have this need to teach, so I research things that interest me and then write about them—to share with you what I've learned. I try to make it entertaining, as teaching should always be. Oh, how I remember the struggle I had to stay awake in class as a teacher droned on. And the day the professor pointed to one of the students and shouted, "You! Wake up that man next to you!" He answered, "You wake him up, you put him to sleep," which got a huge laugh from the bored students and almost killed the professor with apoplexy.

Strong-Arm Tactics

Oh, dowsing skeptic, you who haven't bothered to read any books on the subject, or to try even the simplest of dowsing techniques for yourself, I have a little test for you. A letter from an Art Bell listener triggered this.

A long time ago I reviewed the marvelous book *Vibrations*, by Owen Lehto. It's available from the Acres USA Bookstore, or direct from the author for $20 postpaid. See my *Secret Guide to Wisdom* for his address. Owen shows how anyone can test whether something is good for them to eat or not just by holding the item in the left hand (if they're right-handed) and letting the right arm hang down at the side. If the right arm makes small clockwise circles, that's positive. It's okay. If it goes counterclockwise, it's no good for you.

I read the book, tried his system, and it immediately worked for me. So I went to the office and asked several of the people there to hold an apple in their left hand and let their right arm hang loose. I didn't tell them what was supposed to happen. You got it right, their arms made small clockwise circles. Then I put a piece of candy in their left hand and watched their right arm make counterclockwise circles. It worked for everyone!

Another approach is to hold the right arm out and have someone push down on it. The bad stuff makes the arm weak and easily pushed down. Good stuff makes it almost impossible to push down.

My correspondent used this technique to test for EMF effects from pole transformers. He found that arms began to lose strength at about 0.1 milligauss! The accepted radiation level has been 1.0 milligauss, with power companies accepting anything under 10.

What I'd like to know is what effect our ham rigs are having on us. How about doing the arm test at different points in and out of your house to see what your body's milligauss meter says? Test first with the rig off to see what EMF field effects are there. Then turn on the rig and see what changes that makes. Let me know, okay?

You can also test for the effects of underground streams that may run under your home and be causing long-term health problems. You can read more about this in the dowsing books. And if your skepticism is at full force, know you that these underground stream effects have been measured with scientific instruments.

Home Power

The TV magazine shows have finally started pushing Y2K nervousness. It started in May with a *60 Minutes* interview with the woman in charge of Y2K for Washington DC. She admitted that there is a good possibility that the power grid could go down for a few days to a few weeks. I think reality is finally beginning to soak in.

So what does this mean to you, oh great communicator? It means that if the power goes down, taking with it the telephones, and probably the satellites too, about all communities are going to have left are some CBers, with very limited range, and you, brother ham. That's assuming that you've bothered to upgrade so you can use the HF bands and talk to more than someone within sight. How many repeaters have emergency power systems so they can keep going indefinitely when the power companies are on an extended vacation?

Art Bell W6OBB has put in a whopping solar power system, plus a windmill. I don't think there's anyone in the country who is more knowledgeable about the potential Y2K problems than Art. He's interviewed all of the top experts on his show. In depth. And Art is sincerely worried by what he's learned.

Okay, so what should you get to keep you on the air when the lights go out? A car rig is fine. Or, at least it will be for a day or two. But with the power off, gas pumps won't work, so you'll soon run out of gas. You're going to want to think in terms of solar and wind, just as Art has. And that means that you're going to spend $22.50 and subscribe to *Home Power* magazine, Box 520, Ashland OR 97520, tel. (800) 707-6585. It's edited by Richard Perez N7BCR. His whole crew are hams, and their offices are solar powered. His magazine is packed with great articles on home power systems. Plus ads you'll want to see.

Dayton Bombs

The number of exhibitors was down, with many empty booths. The flea market was down. Attendance was way down. The benefit was that it was a lot easier to get around or to get food. The downside was that there was less to see and less to buy. Many of the exhibitors who did come were crying the blues. And the percentage of computer-oriented exhibitors was up.

I looked over their list of speakers to see what I'd miss if I didn't go this year, thereby saving me almost a week of my time. I found very few speakers who looked interesting. Oh well, that meant more time to get around to the exhibits. But couldn't the organizers have lined up at least one star attraction?

Only the HamVention Committee knows what the actual paid attendance was, and I doubt they'll share this information. The guestimates I've heard put the attendance at around 15,000—about half what it was just a few years ago.

And that makes sense since the number of new HF hams has dried up, and there isn't a lot of attraction for our no-coders at an ARRL-dominated convention. The sad truth is that little has changed in the HamVention formula in the last 40 years, while technology has been going through the roof. It, like the code, is a monument to amateur radio's past.

I attended my first HamVention in 1955. The only difference was that it was then small enough to be held in the Dayton Biltmore Hotel. I attended my first hamfest in 1938 in New York City and, other than the computer exhibitors, I would be hard put to cite any significant changes in the hamfest format back sixty years ago from Dayton today.

The Tesla Society

The International Tesla Society in Colorado Springs seemed to be doing well for many years, hosting some fascinating yearly conferences. I attended three of 'em and was a speaker on cold fusion developments at one. Their book shop was a treasure chest of interesting books. They made far more money on me at their book store during their conferences than from the conference fees. They always had a ham station set up in the hosting hotel lobby, with plenty of hams attending their conferences. Though they attracted a lot of phonies as speakers, they also managed to find some who had valuable information, helping me to make some wonderful contacts.

So I was surprised and disappointed when the Tesla Society stopped sending magazines and disappeared, with no more conferences announced.

Then came an announcement of an Exotic Research conference in Seattle in March, listing quite an array of

speakers. I was disappointed not to see me listed, but them's the breaks. I really enjoy talking to a room full of people, and the bigger the room, the better. Heck, I haven't the slightest qualms about talking to Art Bell's millions of listeners. On the other hand, traveling to Seattle for a conference would take almost a week out of my life, putting me one more week behind in my work. And all that to talk with a couple hundred or so attendees. Plus I'd get to listen to some interesting talks and meet some fascinating people. And some turkeys.

Then an identical announcement came in for a conference in Mesa (AZ) July 22nd–25th. Same cast of characters. Hmm. So I called and found that there were some postal problems which resulted in the Seattle conference being canceled. You can get the details on where and who will be speaking about what from Exotic Research, Box 411, Stanfield AZ 85272, or call (800) 417-6399.

I asked what had happened to the Tesla Society, and was told that they'd gone bankrupt and that Dennis Lee had bought their assets. I'd wondered what Dennis was doing these days. The last I'd heard he had been taking his magic act around the country selling distributorships for his nonexistent products. My letters to him have gone unanswered. I did enjoy the video of him demonstrating his "inventions," but since they seemed to defy any scientific explanation, I was skeptical. I read his book, which told about him being put in prison as a confidence man. Well, we'll see what comes of his Tesla Society purchase.

Nightlights

An article in *Nature* (May 13th) reported a strong correlation between nearsightedness in children and the use of nightlights when they were babies. The same phenomenon has been observed in chicks, so it was no big surprise.

Well, it makes sense that nightlights could affect children. Up until Tommy Edison invented the electric light, people tended to go to sleep when it got dark, so this is a pattern which has been embedded in the deepest and oldest part of the brain, what's called the reptilian brain. You mess with deeply embedded life patterns at your risk. Oh, the many ways we are unknowingly deforming our children!

If parents were aware that smoking, even before conception, would to some degree deform their children, would that be enough to get them to stop? And the same goes for eating sugar, white flour products, pasteurized milk and growth hormone and antibiotic-loaded beef. These poisons all affect the sperm and ova.

"But Mommy, I'm afraid of the dark!" "All the better for the bogey man to sneak out from under your bed and get you, my dear."

And if that isn't enough, if you'll read about melatonin you'll find that even the light when you go to the bathroom at night will stop your body from making melatonin. The light hits your eyes and the message goes to your system that it must be morning, so stop making melatonin.

So what? Spring $7 for Dr. Reiter's Bantam book, *Melatonin*, and read for yourself. This stuff, normally made in the pineal gland, helps you sleep sounder, combats jetlag, counteracts stress, fights off viruses and bacteria, plays a role in how long you live, and even helps protect you from cancer and heart disease. So don't screw around with your melatonin factory by leaving a light or your TV on at night. You may also want to take some supplementary melatonin just before going to bed at night, since as you get older your melatonin factory gets lazy, contributing to your ability to die sooner than might otherwise happen.

Delinquents

As I was reading Dr. Weston Price's *Nutrition and Physical Degeneration*, a 60-year old book that is still in print, and well deserves to be, my ideas about what's gone wrong so that kids are killing kids were confirmed. I bought the book because Dr. Price was a pioneer in the nutrition field, and I'd read his *Degeneration/Regeneration* many years ago and was very impressed by his research. He showed how destructive sugar was to the endocrine system—how that even a teaspoon of refined sugar would upset the calcium-phosphorus ratio in the blood for a whole day, contributing to arthritis and other immune-system disorders.

Dr. Price spent years visiting people living in remote areas of the world, studying their health and teeth. What he discovered was amazing. He found that groups living on their native foods were incredibly healthy, lived long productive lives, and had perfect teeth. They had no need for doctors or dentists.

But then, when the outside world reached them and they were introduced to sugar and white flour products, their teeth started having cavities, their jaw structures changed, their health disintegrated, and they started dying at much earlier ages. But sugar and white bread are addictive, and the results of the diet change were so long in happening that no one noticed the connection.

He visited people early in this century in the remote islands off the Scottish coast, people living in a Swiss village that was cut off from the rest of the country, South Sea islanders, Eskimos, and so on. The story was the same everywhere, and the photos in this well-illustrated book proved what he'd discovered.

He also found that crime was virtually unknown to these people before sugar and white bread were introduced. A generation later, kids were doing criminal things.

I suspect that if we could eliminate sugar and white bread from our American diet, the inner city gangs would disappear and crime would be an anomaly instead of the meat of most newspapers and TV shows. But we're so addicted to pie, ice cream, and candy that I doubt anything can be done, so we'll just have to get used to kids killing kids and stop bitching about it. We'll have to build more prisons and spend more housing the criminals we're making. Well, it's good business for lawyers, judges, the courts, police, prison guards, and so on down the line. We wouldn't want to put millions of lawyers out of business, now, would we? Having no other skills, we'd have to increase our welfare system's cost. Judges, at least, could go on TV for a while and make a buck.

The 524-page 6th edition by Dr. Price is $20, ISBN 0-87983-816-7, Keats Publishing, Box 876, New Canaan CT 06840. Dr. Price is not a great writer, but his data is unassailable and fascinating.

The next time you order apple pie and ice cream, remember that it is shortening your life as surely as smoking a cigarette, and that if you eat this crap before you conceive a child it is going to some degree deform your child, physically and mentally. It's no wonder that kids are going berserk and their grades are plummeting.

Connections

You, I, and everyone else have allowed Congress to gradually increase our taxes, year by year, decade by decade, from the 2% of our salaries 90 years ago, when the income tax was started, to over 50% today. Well, it's fun spending money—particularly when it isn't your money. So we have been electing and then re-electing politicians who have been having a great time spending our money, and then taxing us further so they can spend even more.

In my editorials, I've written about the many unbelievably wasteful programs we've allowed Congress to enact. Like the "War on Drugs," which has

Continued on page 64

PROPAGATION

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Payson AZ 85541
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July

July is never a particularly good month for DX on the HF bands due to high signal absorption levels, and particularly *this* July because we are in the early stages of sunspot cycle 23, in which the solar flux values remain disappointingly low. VHF can be quite good, along with meteor scatter opportunities (Delta Aquarids) for about ten days beginning July 29th.

Your *best* time to work HF band DX will be the 3rd–6th, 19th–21st, and the 25th. The *poorest* days are likely to be the 13th–17th and the 31st. Remaining days will be Fair or trending between one condition and another (see calendar).

There will be a partial lunar eclipse on July 28th, visible in parts of Antarctica, southern and western parts of South America, Central America, parts of North America (except north of Alaska), the Pacific Ocean, Australasia, and eastern parts of Asia.

By the way, if you're interested in weather and other geophysical phenomena, keep a sharp lookout for "conditions" surrounding the 13th and 26th and *semper paratus.*

August

There will be a full solar eclipse on August 11th in the northeastern USA, northern Canada, the North Atlantic Ocean, Europe (including the British Isles), North Africa, Asia (except the eastern part), and the northern Indian Ocean. The eclipse will be partial elsewhere. Totality will occur at approximately local noon.

As usual, the HF bands in August will be recovering from dull summertime conditions, but are not expected to become fully active until September. Sunspot cycle 23 continues to be disappointingly sluggish, with only occasional spurts of the Solar Flux Index to the neighborhood of 200. To take advantage of these times, listen to WWV on 10 MHz at 18 minutes after any hour for the report of "Solar–Terrestrial Conditions."

You can see from the August calendar that there are likely to be a few Good (G) days this month: the 10th, and the 25th–27th. The Poorest days (P, VP) are likely to be on the 4th, 5th, and 19th–21st, which are expected to exhibit some solar flare activity and a very active magnetic field with accompanying ionospheric disturbances. There is a distinct possibility of other geophysical upsets such as earthquakes, hurricanes, and tornadoes at these times. However, conditions following recovery from the poorest days are likely to be very good.

Please note that the band-by-band forecast and the band-time chart are the same for both July and August.

Band-by-band forecast

10–12 meters

Possible short-skip opening due to sporadic-E ionization out to 1300 miles should occur on most days, and to occasionally longer distances on a few days.

15–17 meters

Regular north-south path openings and occasional openings

Continued on page 64

July 1999

SUN	MON	TUE	WED	THU	FRI	SAT
				1 F	2 F-G	3 G
4 G	5 G	6 G	7 G-F	8 F	9 F	10 F
11 F	12 F-P	13 P	14 P	15 P	16 P	17 P-F
18 F-G	19 G	20 G	21 G	22 G-F	23 F	24 F-G
25 G	26 G-F	27 F	28 F-G	29 G-F	30 F	31 F-P

August 1999

SUN	MON	TUE	WED	THU	FRI	SAT
1 G-F	2 F	3 F-P	4 P	5 P	6 P-F	7 F
8 F	9 F-G	10 G	11 G-F	12 F	13 F	14 F
15 F	16 F	17 F	18 F-P	19 P	20 P-VP	21 VP-P
22 P-F	23 F	24 F-G	25 G	26 G	27 G	28 G-F
29 F	30 F	31 F-G				

EASTERN UNITED STATES TO:

GMT:	00	02	04	06	08	10	12	14	16	18	20	22
ALASKA							20	20				
ARGENTINA	10/15	20	20	20	20						10/15	10/15
AUSTRALIA	15	15	15/20	15/20	40/80	40/80	20					15
CANAL ZONE	15	20	20	20	40	40	20	20	20		10	15
ENGLAND	20	20	20		40						20	20
HAWAII	15	15	15/20	20	40/80	40/80						15
INDIA	20	20										
JAPAN							20	20				
MEXICO	15	20	20	20	40/80	40/80	20	20	20		10	15
PHILIPPINES	15	15	15/20	15/20	40/80	40/80	20					
PUERTO RICO	15	20	20	20	40	40	20	20	20		10	15
RUSSIA (C.I.S.)	20	20										20
SOUTH AFRICA		40/80	40/80	20	20	20	20				20	20
WEST COAST	40/80	40/80	40/80	40/80	40/80	40/80	40/80		10/20	10/20		

CENTRAL UNITED STATES TO:

ALASKA							40/20	20				
ARGENTINA	15/20	20/40	20/40								15	15/20
AUSTRALIA	15			20	20/40	20/40	20/40					15
CANAL ZONE	20	20	20	40/80	40/80		20	20	15	15	10	10
ENGLAND	20	20	20/30	40	40		20	20				20
HAWAII	15	15	20	20	20/40	40	40	20	20			15
INDIA			20	20								
JAPAN						40/80	40/80	20	20			
MEXICO	20	20	20	40/80	40/80		20	20	15	15	10	10
PHILIPPINES	15			20	20/40	20/40	20/40					15
PUERTO RICO	20	20	20	40/80	40/80		20	20	15	15	10	10
RUSSIA (C.I.S.)	20	20	20					20				20
SOUTH AFRICA				20/40	20/40	20						

WESTERN UNITED STATES TO:

ALASKA					20	20	40/80	20	20			
ARGENTINA	15/20	15/20	20	20	40	40						15
AUSTRALIA	15	15	15	20	20		40/80	20/40	20			
CANAL ZONE	10/15	15/20	15/20	20/40	40	40		20	20			10
ENGLAND	20	20										
HAWAII	15	15	15	20	20/40	20/40	40		20	20		
INDIA								20	20			
JAPAN				20	20	40/80	40/80		20	20		
MEXICO	10/15	15/20	15/20	20/40	40	40		20	20			10
PHILIPPINES	15	15	15	20	20		40/80	20/40	20			
PUERTO RICO	10/15	15/20	15/20	20/40	40	40		20	20			10
RUSSIA (C.I.S.)	20	20	20					20	20			20
SOUTH AFRICA				20	20							
EAST COAST	40/80	40/80	40/80	40/80	40/80	40/80	40/80		10/20	10/20		

Radio Bookshop

Here are some of the books Wayne has written. Some can change your life, if you'll let them. If the idea of being healthy, wealthy and wise is of interest to you, start reading. Yes, you can be all that, but only when you know the secrets which Wayne has spent a lifetime uncovering.

The Secret Guide to Health: Yes, there really is a secret to regaining your health and adding 30 to 60 years of healthy living to your life. The answer is simple, but it means making some very difficult changes. Will you be skiing the slopes of Aspen with me when you're 90 or doddering around a nursing home? Or pushing up daisies? No, I'm not selling any health products. $5 (H)

The Secret Guide to Wealth: Just as with health, you'll find that you have been brainwashed by "the system" into a pattern of life that will keep you from ever making much money and having the freedom to travel and do what you want. I explain how anyone can get a dream job with no college, no résumé, and even without any experience. I explain how you can get someone to happily pay you to learn what you need to know to start your own business. $5 (M)

The Secret Guide to Wisdom: This is a review of around a hundred books that will help you change your life. No, I don't sell these books. They're on a wide range of subjects and will help to make you a very interesting person. Wait'll you see some of the gems you've missed reading. $5 (B)

Cold Fusion Overview: This is both a brief history of cold fusion, which I predict will be one of the largest industries in the world in the 21st century, plus a simple explanation of how and why it works. This new field is going to generate a whole new bunch of billionaires, just as the personal computer industry did. $5 (C)

The Bioelectrifier Handbook: This explains how to build or buy a little electrical gadget that can help clean the blood of any virus, microbe, parasite, fungus or yeast. The process was discovered by scientists at the Albert Einstein College of Medicine, patented, and then hushed up. It's curing AIDS, hepatitis C, and a bunch of other serious illnesses. The circuit can be built for under $20 from the instructions in the book. $10 (A)

Moondoggle: After reading René's book, *NASA Mooned America*, I read everything I could find on our Moon landings. I watched the videos, looked carefully at the photos, read the astronaughts' biographies, and talked with some of my readers who worked for NASA. This book cites 25 good reasons I believe the whole Apollo program had to have been faked. $5 (D)

Mankind's Extinction Predictions: If any one of the experts who have written books predicting a soon-to-come catastrophe which will virtually wipe us all out are right, we're in trouble. In this book I explain about the various disaster scenarios, from Nostradamus, who says the poles will soon shift, wiping out 97% of mankind, to Sai Baba, who has recently warned his followers to get out of Japan and Australia before March6th this year. The worst part of these predictions is the accuracy record of some of the experts. Will it be a pole shift, a new ice age, a massive solar flare, a comet or asteroid, or even Y2K? I'm getting ready, how about you? $5 (E)

Wayne's Submarine Adventures in WWII: Yes, I spent from 1943-1945 on a submarine, right in the middle of the war with Japan. We almost got sunk several times, and twice I was in the right place at the right time to save the boat. What's it really like to be depth charged? And what's the daily life aboard a submarine like? There are some very funny stories. If you're near Mobile, please visit the Drum. $5 (S)

Improving State Government: Here are 24 ways that almost any state government can cut expenses enormously, while providing far better services. I explain how any government bureau or department can be gotten to cut its expenses by at least 50% in three years and do it cooperatively and enthusiastically. I explain how, by applying a new technology, the state can make it possible to provide all needed services without having to levy *any* taxes at all! Read the book, run for your legislature, and let's get busy making this country work like its founders wanted it to. Don't leave this for "someone else" to do. $5 (L)

Travel Diaries: You can travel amazingly inexpensively – once you know the ropes.Enjoy Sherry and my budget visits to Europe, Russia, and a bunch of other interesting places. How about a first class flight to Munich, a rented Audi, driving to visit Vienna, Krakow in Poland (and the famous salt mines), Prague, back to Munich, and the first class flight home for two, all for under $1,000. Yes, when you know how you can travel inexpensively, and still stay in first class hotels. $5 (T)

Wayne's Caribbean Adventures: More budget travel stories – where I visit the hams and scuba dive most of the islands of the Caribbean. Like the special Liat fare which allowed us to visit 11 countries in 21 days, with me diving all but one of the islands, Guadeloupe, where the hams kept me so busy with parties I didn't have time to dive. $5 (U)

Silver Wire: With two 3" pieces of heavy pure silver wire + three 9V batteries you can make a thousand dollars worth of silver colloid. What do you do with it? It does what the antibiotics do, but germs can't adapt to it. Use it to get rid of germs on food, for skin fungus, warts, and even to drink. Read some books on the uses of silver colloid, it's like magic. $15 (Y)

Classical Music Guide: A list of 100 CDs which will provide you with an outstanding collection of the finest classical music ever written. This is what you need to help you reduce stress. Classical music also raises youngsters' IQs, helps plants grow faster, and will make you healthier. Just wait'll you hear some of Gotschalk's fabulous music! $5 (Z)

Reprints of My Editorials from *73*.

Grist I: 50 of my best non-ham oriented editorials from before 1997. $5 (F)

Grist II: 50 more choice non-ham editorials from before 1997. $5 (G)

1997 Editorials: 240 pages. 216 editorials discussing health, ideas for new businesses, exciting new books I've discovered, ways to cure our country's more serious problems, flight 800, the Oklahoma City bombing, more Moon madness, and so on. In three $5 volumes. $15 (O)

1999 Jan-Aug Editorials: 188 pages in two $5 volumes. Bringing you up to date. $10 (P)

Ham-to-Ham: 45 of my ham-oriented editorials. These will help you bone up on ham history. Great stuff for ham club newsletter filler. Yes, of course these are controversial. $5 (Q)

$1 Million Sales Video: How to generate extra million in sales using PR. This will be one of the best investments your business ever made. $43 (V)

One Hour CW: Using this sneaky method even *you* can learn the Morse Code in one hour and pass that dumb 5wpm Tech-Plus ham test. $5. (CW)

Code Tape (T5): This tape will teach you the letters, numbers and punctuation you need to know if you are going on to learn the code at 13 wpm or 20 wpm. $5 (T5)

Code Tape (T13): Once you know the code for the letters (T5) you can go immediately to copying 13 wpm code (using my system). This should only take two or three days. $5 (T13)

Code Tape (T20): Start right out at 20 wpm and master it in a weekend for your Extra Class license. $5 (T20)

Code Tape (T25): Same deal. It doesn't take any longer to handle 25 wpm as it does 13. Or use the ARRL system & take six months.$5 (T25)

Wayne Talks at Dayton: This is a 90-minute tape of the talk I'd have given at the Dayton, if invited. $5 (W1)

Wayne Talks at Tampa: This is the talk I gave at the Tampa Global Sciences conference. I cover cold fusion, amateur radio, health, books you should read, and so on. $5 (W2)

Stuff I didn't write, but you need:

NASA Mooned America: René makes an air-tight case that NASA faked the Moon landings. This book will convince even you. $25 (R1)

Last Skeptic of Science: This is René's book where he debunks a bunch of accepted scientific beliefs – such as the ice ages, the Earth being a magnet, the Moon causing the tides, and etc. $25 (R2)

Elemental Energy Subscription: I predict this is going to be the largest industry in the world in about 20-30 years. They laughed at me when I predicted the personal computer growth in 1975. PCs are now the third largest industry in the world. The elemental energy ground floor is still wide open, but then that might mean giving up watching ball games and talk shows on the boob tube. $30 for six issues. (EE). A sample issue is $10.

Three Gatto Talks: A prize-winning teacher explains what's wrong with American schools and why our kids are not being educated. Why are Swedish youngsters, who start school at 7 years of age, leaving our kids in the dust? Our kids are intentionally being dumbed down by our school system — the least effective and most expensive in the world. $5 (K)

.....Wayne

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The *73* Flea Market, Barter 'n' Buy, costs you peanuts (almost)—comes to 35 cents a word for individual (noncommercial!) ads and $1.00 a word for commercial ads. Don't plan on telling a long story. Use abbreviations, cram it in. But be honest. There are plenty of hams who love to fix things, so if it doesn't work, say so.

Make your list, count the words, including your call, address and phone number. Include a check or your credit card number and expiration. If you're placing a commercial ad, include an additional phone number, separate from your ad.

This is a monthly magazine, not a daily newspaper, so figure a couple months before the action starts; then be prepared. If you get too many calls, you priced it low. If you don't get many calls, too high.

So get busy. Blow the dust off, check everything out, make sure it still works right and maybe you can help make a ham newcomer or retired old timer happy with that rig you're not using now. Or you might get busy on your computer and put together a list of small gear/parts to send to those interested?

Send your ads and payment to: *73 Magazine*, Barter 'n' Buy, 70 Hancock Rd., Peterborough NH 03458 and get set for the phone calls. The deadline for the October 1999 classified ad section is August 10, 1999.

President Clinton probably doesn't have a copy of *Tormet's Electronics Bench Reference* but you should. check it out at **[www.ohio.net/~rtormet/index.htm]**—over 100 pages of circuits, tables, RF design information, sources, etc. BNB530

DFjr direction finder and MicroPLL programmable transmitter (formerly Agrelo) are now back under new management! Check exciting new accessories and upgrades. Order online at **www.swssec.com** or call SWS Security at 410-879-4035 (9-5 ET). BNB220

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Cash for Collins: Buy any Collins Equipment. **Leo KJ6HI.** Tel./FAX (310) 670-6969. [radioleo@earthlink.net] BNB425

MAHLON LOOMIS, INVENTOR OF RADIO, by Thomas Appleby (copyright 1967). Second printing available from **JOHAN K.V. SVANHOLM N3RF**, SVANHOLM RESEARCH LABORATORIES, P.O. Box 81, Washington DC 20044. Please send $25.00 donation with $5.00 for S&H. BNB420

METHOD TO LEARN MORSE CODE FAST AND WITHOUT HANGUPS Johan N3RF. Send $1.00 & SASE. SVANHOLM RESEARCH LABORATORIES, P.O. Box 81, Washington DC 20044 USA. BNB421

Great New Reference Manual with over 100 pgs of P/S, transistor, radio, op-amp, antenna designs, coil winding tables, etc. See details at [www.ohio.net/~rtormet/index.htm] or send check or M.O. for $19.95 + $2.00 P&H to RMT Engineering, 6863 Buffham Rd., Seville OH 44273. BNB202

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WANTED: High capacity 12 volt solar panels for repeater. [**kk4ww@fairs.org**] or (540) 763-2321. BNB2630

COLLOIDAL SILVER GENERATOR! Why buy a "box of batteries" for hundreds of dollars? Current regulated, AC powered, fully assembled with #12 AWG silver electrodes, $74.50. Same, but DC powered, $54.50. Add $2.50 shipping. **Thomas Miller**, 314 South 9th Street, Richmond IN 47374. BNB342

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Electricity, Magnetism, Gravity, The Big Bang. New explanation of basic forces of nature in this 91-page book covering early scientific theories and exploring latest controversial conclusions on their relationship to a unified field theory. To order, send check or money order for $16.95 to: American Science Innovations, PO Box 155, Clarington OH 43915. Web site for other products [http://www.asi_2000.com]. BNB100

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PROPAGATION

continued from page 62

toward Europe and Africa peaking during local afternoon hours can be expected.

20 meters

This is likely to be the best band for worldwide propagation of signals that will be strongest an hour or two after local sunrise and again in the late afternoon and early evening hours. Short-skip beyond 500 miles should be good as well.

30–40 meters

You can expect DX openings during local evening, nighttime, and sunrise hours, limited by high noise levels due to thunderstorms along the signal path. Peak conditions occur toward the east around midnight and in other directions just before sunrise. Short-skip up to 1000 miles should occur during daylight hours, and 500–2300 miles at night is likely.

80 meters

Some short-skip propagation of 250 miles or so may occur during daylight hours and to 2,000 miles or so at night, but *no* daytime DX will take place due to signal absorption. During hours of darkness and just before sunrise, however, DX is possible to some areas of the world. High noise levels due to thunderstorms along the signal path will limit both short-skip and DX communication.

160 meters

No daytime propagation expected, but some DX and short-skip propagation should take place at night in spite of high static noise levels. 73

NEVER SAY DIE

continued from page 61

cost trillions and accomplished absolutely nothing. Like the "War on Poverty," which has only enriched the government bureaucracy, and hasn't done spit when it comes to having fewer poor.

The letters NRA have been in the news a lot lately — remember, Never Re-elect Anyone. 73

JRC

JST-245

160-10 Meters PLUS 6 Meter Transceiver

Fifteen reasons why your next HF transceiver should be a JST-245. . .

1 All-Mode Operation (SSB,CW,AM,AFSK,FM) on all HF amateur bands and 6 meters. JST-145, same as JST-245 but without 6 meters and built-in antenna tuner.

★ JST-145 COMING SOON ★

2 MOSFET POWER AMPLIFIER • Final PA utilizes RF MOSFETs to achieve low distortion and high durability. Rated output is 10 to 150 watts on all bands including 6 meters.

3 AUTOMATIC ANTENNA TUNER • Auto tuner included as standard equipment. Tuner settings are automatically stored in memory for fast QSY.

4 MULTIPLE ANTENNA SELECTION • Three antenna connections are user selectable from front panel. Antenna selection can be stored in memory.

5 GENERAL COVERAGE RECEIVER • 100 kHz-30 MHz, plus 48-54 MHz receiver. Electronically tuned front-end filtering, quad-FET mixer and quadruple conversion system (triple conversion for FM) results in excellent dynamic range (>100dB) and 3rd order ICP of +20dBm.

6 IF BANDWIDTH FLEXIBILITY • Standard 2.4 kHz filter can be narrowed continuously to 800 Hz with variable Bandwidth Control (BWC). Narrow SSB and CW filters for 2nd and 3rd IF optional.

7 QRM SUPPRESSION • Other interference rejection features include Passband Shift (PBS), dual noise blanker, 3-step RF attenuation, IF notch filter, selectable AGC and all-mode squelch.

8 NOTCH TRACKING • Once tuned, the IF notch filter will track the offending heterodyne (±10 Khz) if the VFO frequency is changed.

9 DDS PHASE LOCK LOOP SYSTEM • A single-crystal Direct Digital Synthesis system is utilized for very low phase noise.

10 CW FEATURES • Full break-in operation, variable CW pitch. built in electronic keyer up to 60 wpm.

11 DUAL VFOs • Two separate VFOs for split-frequency operation. Memory registers store most recent VFO frequency, mode, bandwidth and other important parameters for each band.

12 200 MEMORIES • Memory capacity of 200 channels, each of which store frequency, mode, AGC and bandwidth.

13 COMPUTER INTERFACE • Built-in RS-232C interface for advanced computer applications.

14 ERGONOMIC LAYOUT • Front panel features easy to read color LCD display and thoughtful placement of controls for ease of operation.

15 HEAVY-DUTY POWER SUPPLY • Built-in switching power supply with "silent" cooling system designed for continuous transmission at maximim output.

JRC *Japan Radio Co., Ltd.*

430 Park Ave., 2nd Floor New York, NY 10022 Phone: (212) 355-1180 Fax: (212) 319-5227

CIRCLE 159 ON READER SERVICE CARD

The New Approach to HF Radio!

The Kachina 505DSP Computer Controlled Transceiver

Features:

- Works with any Computer Running Windows 3.1, 95 or NT
- Covers all Amateur HF Bands plus General Coverage Receiver
- IF Stage 16/24 Bit Digital Signal Processing (DSP)
- II DSP Bandpass Filter Widths from 100 Hz to 3.5 kHz (6 kHz in AM Mode)
- Band Activity Display with "Point and Click" Frequency Tuning
- On-screen Antenna "Smith" Chart, Logging Software and Help Menus
- Automatic Frequency Calibration from WWV or Other External Standard
- "Snapshot" Keys for Instant Recall of Frequencies and Settings
- Optional Internal Antenna Tuner

The Kachina 505DSP Computer Controlled HF Transceiver After twenty years of building commercial transceivers in Arizona, Kachina has decided the time is right for a new approach to amateur radio. The Kachina 505DSP is nothing short of a revolution in HF transceivers.

Why Use Knobs & Yoke When Windows? The old-fashioned front panel has become too cluttered to be useful. Too many knobs, too many buttons. Kachina's 505DSP transceiver connects to your computer's serial port and is completely controlled under Windows™. With optional cables, the radio may be remotely located up to 75 feet away from your computer. Imagine combining a state-of-the-art DSP transceiver with the processing power and graphics capabilities of your PC and you'll soon wonder why all radios aren't designed this way. Why settle for a tiny LCD display when your computer monitor can simultaneously show band activity, antenna impedance, heat sink temperature, SWR, forward and/or reflected power and a host of other information?

16/24 Bit DSP/DDS Performance In addition to 100% computer control, the Kachina 505DSP offers exceptional 16/24 bit DSP/DDS performance. IF stage DSP, "brick-wall" digital filtering, adaptive notch filters and digital noise reduction, combined with low in-band IMD and high signal-to-noise ratio, produce an excellent sounding receiver. Sophisticated DSP technology achieves performance levels unimaginable in the analog world. The transmitter also benefits from precise 16/24 bit processing. Excellent carrier and opposite-sideband suppression is obtained using superior phasing-method algorithms. The RF compressor will add *lots* of punch to your transmitted signal without adding lots of bandwidth, and the TX equalizer will allow you to tailor your transmitted audio for more highs or lows.

Seeing is Believing American-made and designed, and able to stand on its own against the world's best, the 505DSP is bound to set the standard for all that follow. But don't take our word for it. Visit our website at http://www.kachina-az.com for detailed specifications, to download a demo version of our control software, or to see a current list of Kachina dealers displaying demonstration models in their showrooms.

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